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# TROPICAL DISEASES BULLETIN

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BUREAU OF HYGIENE AND TROPICAL DISEASES.

# TROPICAL DISEASES BULLETIN.

Vol. 37.] 1940. [No. 9.

## SUMMARY OF RECENT ABSTRACTS.*

### VII. HELMINTHIASIS.

[continued from p. 547]

*Ascaris infection, etc.*—LANE (p. 721) restates certain essential points in the diagnosis of Ascaris infection. For successful diagnosis by D.C.F. four essentials are necessary :—The presence of fertile eggs, the proper disintegration of faeces, the use of a vessel large enough to prevent over-concentration, and especially a floating fluid of *ascertained* specific gravity of just over 1,200. With these conditions satisfied the variations in D.C.F. counts are much smaller, and the numbers of eggs recovered much larger, than with the Willis technique. Three-quarters saturation of salt solution is optimum for hookworm eggs but for Ascaris and Trichuris is insufficient and leads to great error. He refers to airborne infection by Ascaris and to the breeding of cockroaches, which may disseminate Ascaris eggs, in bore-hole latrines, adding a comment that search for a better type of latrine should be continued.

LEATHERS *et al.* (p. 592), using the Stoll-Hausheer technique found infection with Ascaris in 1·9 per cent. of whites and 6·5 per cent. of negroes in Florida. The more persons in a family infected the greater was the average weight of infection, as judged by egg counts.

From autopsy examinations on patients whose stools had been examined during life, HSÜ and CHOW (p. 144) show that examination had detected only 70·4 per cent. of persons infected with Ascaris. Direct smear, with floatation or other methods when indicated, had been employed. WINFIELD and CHIN (p. 319) refer to the important part played by children in polluting the household environment in an urban population in N. China.

YOSHIDA and TOYODA (p. 722) discuss the artificial hatching of Ascaris eggs in different media. The most favourable temperature was between 36° and 40°C. In comment LANE refers to the work of BROWN which showed that the only condition which inevitably produced hatching of mature eggs was drying followed by moistening.

SANG (p. 321) has found in a watery extract of Ascaris a protease which inhibits the action of trypsin. This effect presumably explains

* The information from which this series of summaries has been compiled is given in the abstracts made by the Sectional Editors in the *Tropical Diseases Bulletin*, 1939, Vol. 36. References to the abstracts are given under the names of the authors quoted and the pages on which the abstracts are printed.

the inability, sometimes found in patients with this infection, to digest protein. VANNI (p. 724) found in the coelomic fluid of *Parascaris equorum* a substance capable of producing the Sanarelli phenomenon in sensitized rabbits, together with the allergic symptoms urticaria and asthma which in man may be caused by the body fluid of Ascaris.

VOEGTLIN (p. 321) reports Ascaris extracted by a patient from the back of the throat. MILLAN and NESPOLO (p. 321) report death from suffocation due to several Ascaris in the trachea of a child. PIRES (p. 722) reports asphyxia from Ascaris in the trachea, intestinal obstruction relieved when 280 of the worms were passed, and an extraperitoneal abscess containing a decomposing Ascaris. RAJAHRAM (p. 321) found in a child five abscesses of the liver each of which contained Ascaris. The bile ducts were dilated and inflamed and contained more of the worms. LECERCLE (p. 723) records a fatal case of acute haemorrhagic pancreatitis probably due to Ascaris in the bile ducts near the duct of Wirsung. FLAMINI (p. 723) reports perforation, due to Ascaris, of all coats of the appendix except the serosa. ZAHAWI (p. 321) reports death from obstruction of the small intestine due to a mass of Ascaris weighing two pounds. The wall of the greatly enlarged appendix, which contained four of the worms, was found to be thinned and its mucosa was absent.

KO (p. 322) records the escape of 16 Ascaris through the umbilicus of a child, who showed no other ill-effects. CHANCO (p. 723) also reports the escape of Ascaris from the umbilicus of a child.

For the treatment of Ascaris infection MAPLESTONE and MUKERJI (p. 322) use oil of chenopodium together with santonin, but point out that reduction of the amount of the former in children to conform with age, in the usual manner, renders the treatment unsuccessful. This they think may be due to the fact that whatever the size of the host, the worms are the same, or that as the worms more readily infect young than old, it may be a matter of power to maintain position. LANE in comment suggests that the power to produce the true anthelmintic substance from absorbed ascaridole is not so marked in the young as in the adult, and quotes other work which shows that ascaridole is, in fact, absorbed and changed in the human body, its products being excreted in the urine.

DEMPSTER (p. 320) in W. Samoa found a discrepancy between the infection rates with Ascaris and Trichuris. These rates theoretically should be similar and he attributes the comparatively low Ascaris rate to the mass treatments which have been given, since the sanitary conditions have long been static. Mass treatment, which is the only present method of control, is therefore justified.

*Enterobius and Strongyloides infection.*—CRAM and REARDON (p. 845) report Enterobius infection in 41 per cent. of a group of more than 2,000 white people from Washington. Infection is commonest in the congested residential sections of the city, but is heavy even in good social conditions.

NOLAN and REARDON (p. 845) found eggs of Enterobius in dust collected at all levels in all the rooms of 7 houses in which lived infected persons. Some of the eggs must have been carried by air currents and infection by inhalation is therefore theoretically possible. A large proportion of the eggs were probably viable. HALL (p. 846) points out that as Enterobius eggs are not, except by accident, faecal constituents, they are not prevented from spreading by the ordinary sanitary measures which limit ordinary intestinal parasites. Eggs when

dry will fall from the body and sift through clothing to be spread widely and even carried by air. Treatment is probably the only effective means of combat, but the use of a vacuum cleaner may help. REARDON (p. 329) has found a mean of 11,105 eggs to each gravid female *E. vermicularis*. This partly explains the familial nature of the infection and the fact that it is the commonest worm infection of man.

JONES (p. 328) describes the technique of examination for eggs of Enterobius by means of the Cellophane NIH swab, and REARDON (p. 328) points out that certain artifacts which may simulate the eggs are often found embedded in the Cellophane.

WRIGHT and BRADY (p. 329) advocate gentian violet *per os* in the treatment of Enterobius infection. Details of dosage are given. WRIGHT *et al.* (p. 846) report clinical improvement following single doses of tetrachlorethylene. HAMBURGER (p. 846) points out the danger of the production of neurosis from over-treatment of Enterobius infection.

TORRES and DE AZEVEDO (p. 844) found post-mortem evidence that larvae of Strongyloides, born presumably in the intestinal canal, had penetrated the wall of the colon, entered the lymph or blood stream and reached the liver and lungs. GALLIARD (p. 328), however, holds that auto-infection by Strongyloides is not common and quotes three post-mortem examinations of infected persons in whom active rhabditiform and filariform larvae were found with no sign of penetration of the intestinal wall.

DE PAULA E SILVA (p. 843) states that examination of duodenal contents is a more certain means of diagnosis of Strongyloides infection than is faecal examination.

SIMPSON (p. 844) describes the treatment of Strongyloides infection by means of compound solution of iodine introduced into the duodenum through a tube.

*Ankylostomiasis, etc.*—LEATHERS *et al.* (p. 828) examined the faeces of 29,064 white persons in Florida by the Stoll-Hausheer technique. The average percentage found infected with hookworm was 34·8, but was least in those districts in which the economic state was best and in which the standard of sanitary cleanliness was highest. The peak of infection was found between the ages of 15 and 19 years. It was once more shown that the more infected in a family the higher the egg count per person. The proportion found infected in 4,121 negroes was 19·9 per cent. In a series of 809 autopsies in Peiping, HSÜ and CHOW (p. 144) found 127 infected with hookworms (*A. duodenale* or *N. americanus*). Of these 72 had undergone stool examination during life, but in 45 no ova had been found. The direct smear method, with floatation or other methods when indicated, had been used in the laboratory. MOISE (p. 829) found infestation with both *A. duodenale* and *N. americanus* in Provinces of Italian Somaliland in which hookworm infection had not previously been known to exist. Of 423 negative to a smear, infection was found in 45 per cent. by the Willis technique.

Writing of overt blood loss in relation to anaemia, SCOTT (p. 324) states that hookworm infestation is probably the commonest world-wide cause of such loss. In a healthy man iron exists in the haemoglobin (about 2·3 gm.), in the iron reserve of the liver, bone marrow and spleen (about 1·15 gm.) and in unavailable form in the tissues. A man may lose half his blood and yet may recover completely from the anaemia, without the administration of iron, by using up his iron

reserve, but if that reserve is gone, even trivial haemorrhage will lead to persistent anaemia. DÍAZ (p. 323) in the city of Resistencia found no correlation between the estimated weight of hookworm infection in children and the anaemia induced.

Ankylostomiasis is an industrial disease in the French miners of the Loire, and DOUBROW (p. 322) found infection in 1,236 of some 7,000 examined by the Telemann method. Symptoms were not found in 83 per cent. of these ; the rest were anaemic, some gravely so. Treatment is by freshly powdered thymol in cachets, three doses each of 1 gm. given at hourly intervals on three consecutive days, a total of 9 gm. A purge is given on the fourth day and all treatment is given in hospital.

PEERY (p. 831) describes the pathological findings in three cases of fatal poisoning after the accidental drinking of large quantities of carbon tetrachloride mixed with ethylene dichloride. Two patients who lived for a few days showed extensive necrosis in the liver, especially in the central zone of the lobules, and damage to the convoluted tubules of the kidneys. Jaundice and multiple haemorrhages were also present. GUNEWARDENE (p. 832) reports decomposition of tetrachlorethylene with the production of phosgene. Symptoms which had followed the administration of this impure specimen were rapid, small pulse, with pallor, shallow and sighing respiration, indistinct speech, dimness of vision and drowsiness, but there were no deaths.

FERNANDO *et al.* (p. 832) report favourably on tetrachlorethylene in treatment. It was given in doses of 3 to 8 cc. in Mist. alb. and the best results were obtained with the largest doses. There was no toxic action on liver, kidneys, heart or lungs, but temporary effects resembling those of narcotic drugs may be produced. Children may be given doses of four to five times the age in minims. GARIN and ROMAN (p. 833) also advocate the use of tetrachlorethylene.

PESSÔA and PASCALE (p. 323) in São Paulo found the greatest weight of infection with *N. americanus* at the age of 15 to 19 years, and regard the diminution over 20 as evidence of acquired age resistance. In communities in which simple (presumably pit) latrines are used only about half as many eggs per gm. of faeces were found as in those in which there were no latrines. There was no direct relationship between detected egg numbers and the percentage of haemoglobin. Tetrachlorethylene treatment reduced egg numbers by 46 to 49 per cent. after one administration and by 78 to 84 per cent. after two, but the numbers of Ascaris eggs were increased by 9 per cent. after 2 cc. of the drug had been given.

SCOTT and BARLOW (p. 36) show that the provision of bore-hole latrines in the village houses of Egyptian peasants has not resulted in a lowering of the rate of infection with hookworms and schistosomes. These infections, however, are acquired under field conditions and house sanitation can hardly be expected to influence them significantly, but it is hoped that the people, once accustomed to using latrines in their homes may be induced to accept and use them in the fields.

NICHOLLS and GUNAWARDANA (p. 590) describe a method of composting night soil in refuse, which destroys eggs of Ascaris and the free-living stages of hookworms. The night soil is trenched into rectangular heaps of refuse, covered and watered daily. Each week for four weeks the mass is turned over so that the outer portions are placed in the middle and further night soil is trenched in the mass. Thereafter the

daily watering and weekly turning are repeated for three months, by which time the mass, in parts of which the temperature reaches 60°C., has become a fine mould. The proportions of night soil to refuse are given in the original abstract. The method can be used in the rainy season.

ROUBAUD and DESCHIENS (p. 833) have found that infective larvae of hookworms and Strongyloides are captured and digested by certain microscopic fungi if the soil is seeded with the fungi.

FISK (p. 591) reports the finding of nine *N. americanus* and 147 *A. duodenale* in the intestine of a child aged one month and eight days who died from the infection, and suggests that it must have been set on the ground near a latrine, but in comment LANE points out that the closely related *A. caninum* can apparently be transmitted from a pregnant dog to its foetus. AKETAGAWA (p. 325) concludes from experiments with *A. caninum* that infective larvae swallowed by dogs penetrate the wall of the alimentary canal and do not remain in the lumen. On examination of the bodies 3 to 4 and 10 days after the infective feed the proportions of larvae recovered were, in pups, about 50 and 98 per cent., but in adult dogs this was reversed and lowered to 24 and 3·7 per cent. respectively. The foetuses in pregnant bitches were infected, chiefly in the lungs.

OTTO and KERR (p. 833) injected small numbers of living infective larvae of *A. caninum* into dogs at bi-weekly intervals and subsequently gave large infecting doses (up to 200,000 larvae) to these animals and to controls. The health of the immunized animals was scarcely disturbed and comparatively few worms were recovered at autopsy, but all except one of the controls died within 14 days and the number of worms recovered was very much larger. It is concluded that "there is nothing distinctive about the so-called age resistance, but rather that maturity and good health are essential for the host to respond fully and quickly to the stimulus of invading worms, *i.e.*, actively to acquire immunity."

v. BRAND and OTTO (p. 325) show that *A. caninum* does not appear to store glycogen, presumably because of the continuous food supply available in the process of sucking blood, and that heavy infestation with this worm does not affect the carbohydrate metabolism of the host.

SCHENKEN and MOSS (p. 845) describe the first reported case of *Trichostrongylus colubriformis* infection of man in America.

*Filariasis.*—The work of O'CONNOR and KNOTT (p. 151) on a patient with chylous lymphatic varix which was excised and which contained adult *W. bancrofti* confirms previous opinion that development of embryos *in utero* is simultaneous [in the different living females]. It was originally thought that parturition always occurs about noon, but the present study does not uphold that view.

KHALIL (p. 326) believes that the periodicity or non-periodicity of *W. bancrofti* embryos is governed by the site of the adult worm in the human body, and that this again is influenced by the biting habits of the vectors. In the South Pacific the vector is Aëdes, a day biter which chiefly attacks the upper extremities; the adults inhabit the corresponding lymphatics and the embryos pour directly into the veins of the neck or the terminal part of the thoracic duct; there is no periodicity in the blood. Elsewhere the vector is Culex, an evening biter which chiefly attacks the lower limbs; the adults inhabit the corresponding lymphatics and the embryos pass into the thoracic duct.

In the daytime man's position is mainly erect and gravity retains the embryos from the legs in the lower part of the thoracic duct and its tributaries; at night man's attitude is horizontal, and the maximum flow of chyle, which is said to take place about 12 hours after a meal, aids gravity in dispersing the embryos into the circulation about midnight. In comment, LANE quotes BAHR's work in the S. Pacific which showed that the habitat of the adult worms showed no perceptible discrimination in favour of the arm, and BUXTON's work which indicated that the locality of enlarged and presumably infected glands had no obvious relationship to the type of infection. Khalil further states that embryos disappear into the lymphatics when absent from the peripheral blood.

He also claims that warmth attracts adult *W. bancrofti*, that the spermatic region is the warmest in the body, and that, since the lymphatics of that region are the first in which the valves lose their function, there is direct communication between them and the pelvic and abdominal lymphatics, with the result that the worms migrate back and forth between them and the genitalia while most patients suffer no symptoms. If, however, the worms block a vessel it dilates and may leak, causing lymphangitis of an allergic nature. "Filarial lymphangitis, elephantoid fever, Calabar swellings, the various skin manifestations of onchocerciasis and *A. perstans* infection are different grades of the same phenomenon" and bacterial infection is only secondary. In treatment, therefore, adrenalin will be useful.

HSÜ (p. 836) shows that *Culex vagans* is a very suitable intermediate host for the larvae of *W. bancrofti*. When a series of *C. vagans* and a series of *C. pipiens* var. *pallens* were fed at the same time on the same infected person, 74 out of 78 of the former and 47 out of 49 of the latter showed infective larvae after 12–18 days. GALLIARD (p. 150) found that the larva of *W. bancrofti* is able to reach the infective stage in *Aëdes aegypti*. VAN BEUKERING (p. 834) found a naturally infected *A. ludlowi* in the Mentavei Islands, Sumatra. YAO *et al.* (p. 150) observed development of *Mf. bancrofti* in *Phlebotomus sergenti* var. *mongolensis* as far as the post-sausage form. It is thought that further development might have occurred had the insects remained alive for a longer period.

YOKOGAWA (p. 836) found that larvae of *W. bancrofti* were completely digested when ingested by Cyclops; monkeys into whose alimentary canal larvae were introduced did not become infected. Larvae did not penetrate when placed on the intact skin of animals, but did so when the skin had been treated with a depilatory and then needled, and the author obtained evidence suggesting that one larva penetrated through a mosquito puncture. He concludes that the spread of the disease is largely a matter of chance and is limited by a number of adverse factors. In a search for alternative hosts which might be concerned in the transmission of *W. bancrofti*, YOKOGAWA and YOSHINO (p. 837) were unable to find that the flea *Pulex irritans* played any part.

The work of IYENGAR (p. 148) shows that *Mf. malayi* and *Mf. bancrofti* are widespread in Travancore and that the former, which has a rural distribution in coastal sandy areas, is the more prevalent, while the latter, with an urban distribution, is less so. Male genitalia were affected far more frequently in *Mf. bancrofti* infections than in those due to *Mf. malayi*; the reason for this is not yet understood.

Evidence is given to show that *Mf. malayi* is transmitted by Mansonioides species, especially *M. annulifera*, which breed in connexion

with the floating water plant *Pistia stratiotes*, the larvae taking air from the air spaces which exist in the roots of this plant. Clearance of this plant from the surface of water results in rapid disappearance of the larvae, and in ponds in which Pistia is not present, no Mansonioides are found. The food materials of the larvae are provided in the process of steeping coconut husks in water, an essential step in coir making, which is a staple industry of the area and which is carried out in tanks on which Pistia grows. The larvae cannot therefore be attacked through their food supply, but the removal of Pistia is strikingly successful in eliminating Mansonioides. DASSANAYAKE (p. 834) states that in Galle, Ceylon, although infection with *W. bancrofti*, transmitted by *C. fatigans*, is common, elephantiasis of the leg known as Galle leg is due to infection by *Mf. malayi* which does not cause genital infections. *Pistia stratiotes* and *Mansonia uniformis* are abundant in places where infection is due to *Mf. malayi*.

In the Federated Malay States endemic filariasis is due to *Mf. malayi* and POYNTON and HODGKIN (p. 149) show that this infection is confined to low lying areas near rivers and swamps. Infection with *W. bancrofti* is sporadic apart from Singapore. Elephantiasis is common, especially in adult males who work or live in swamps where they are bitten by the vectors of *Mf. malayi*, the genus Mansonioides. The authors consider that the female worms discharge a fresh batch of embryos about once each month and that this causes the recurrent attacks of lymphangitis which are set up by the migration of enormous numbers of the sheathed microfilariae through the walls of the lymphatics to the blood stream. The microfilariae die in the thickened lymphatic walls and set up intense local reaction. The proportion of embryos in the day and night blood was found to be only 1 to 5 as against 1 to 1,000 with *Mf. bancrofti*. The authors give information regarding elephantiasis and the results of intradermal tests with an antigen from *Dirofilaria immitis*. For prevention they advocate the removal of dwellings away from swamps and the draining of swamps. [It is later shown by HODGKIN, this *Bulletin*, 1940, Vol. 37, p. 302, that the principal vector, *M. longipalpis*, does not develop in association with *Pistia stratiotes* but rather in association with the fine roots of certain swamp-loving trees. Removal of Pistia is therefore not a useful measure of control in this area.]

POYNTON and HODGKIN (p. 839) have found microfilaria indistinguishable from *Mf. malayi* in a monkey, *Macaca irus*.

GALLIARD (p. 837) obtained transformation of Mansonia species from fourth stage larvae and pupae to adults in distilled water in Indo-China, and concludes that the larvae and pupae can on occasion obtain oxygen directly from the water surface, like other mosquitoes, instead of through the water plants with which they are usually associated.

KNOTT (p. 152) discusses the treatment of elephantiasis of the leg. Prolonged firm bandaging effects a gradual removal of the lymphoedema, the patient gets prompt symptomatic relief and the recurrent attacks of lymphangitis cease. A bandage boot of Turkish towelling cemented to a crêpe bandage by dextrin syrup and supported by lateral splints should be applied to the foot and leg tightly enough to cause cyanosis of the toes. Cyanosis disappears on walking when movement forces the lymph upwards. When the limb shrinks a new boot may be applied. If the thigh also requires support burlap strips are used over the towelling and splints, and lacing is run into this so that the covering

may be tightened at will. With this treatment the leg is greatly reduced, the skin becomes soft and excrescences disappear, lymphangitis is lessened and so far has not recurred in those legs completely reduced. The bandages are not removed during an attack of lymphangitis but for a pyogenic infection removal is necessary. After this treatment operation is greatly facilitated by the reduction in size of the leg.

MAKAR (p. 838) discusses points in the surgery of intrascrotal filariasis, emphasizing that in excision operations diseased tissue only should be removed because collateral lymphatic circulation may have been overtaxed by previous inflammation. CHABEUF (p. 153) employs septasine or soluseptasine for the treatment of acute inflammation which often follows surgical interference in elephantiasis.

MEYERS and KOUWENAAR (p. 838) describe generalized swelling of the lymph glands, associated with severe eosinophilia, in 7 men in Java. In one excised gland there were eosinophilic abscesses and microfilariae which could not be identified. No microfilaria could be found in the blood. BONNE (p. 838) describes infestation with microfilaria of the spleen tissue of a Javanese; there was eosinophilia and giant cell formation round the larvae. This condition may be either an undescribed phase of a common infection, or an unusual parasite, possibly akin to that described by MEYERS and KOUWENAAR above.

UNDERWOOD and HARWOOD (p. 840) found that in a dog transfused with blood containing microfilariae of *D. immitis* the microfilariae survived in the blood stream for more than two years, but comparatively few were found in the blood soon after the injection. They conclude that a proportion of the embryos leave the blood stream but do not agree with the hypothesis that most are destroyed by the reticulo-endothelial cells. In comment, however, LANE criticizes the conclusions reached by the authors and restates the findings on which his argument as to the action of the reticulo-endothelial system is based.

KUBO (p. 155) observed a marked seasonal as well as daily periodicity in the number of microfilariae of *D. immitis* found in the blood of two dogs examined in Peiping.

MOLSER (p. 841) states that *A. perstans* is capable of causing fever, and that intravenous 1 per cent. methylene blue may eliminate the microfilariae from the blood.

HAWKING (p. 841) reports having found onchocerciasis at Kakamega, Kenya. HARLEY-MASON (p. 841) also reports three cases, all with ocular symptoms, from the same district. GOPSILL (p. 841) has found 20 cases of onchocerciasis in Nyasaland, where *Simulium damnosum* breeds along the fast-flowing highland streams. Nodules were seen but there were no ocular disturbances. ADVIER and DEJOU (p. 842) report acute arthritis of the knee with many *Mf. volvulus* in the synovial fluid; in the popliteal space was a subfascial Onchocerca cyst. Infection with Dracunculus was also present.

SOUTHWELL and KIRSCHNER (p. 155) describe their observations on larvae of *D. medinensis* after ingestion by Cyclops.

DAENGSVANG and TANSURAT (p. 156) have found that the frog *Rana rugulosa*, the eel *Monopterus albus* and two freshwater fish are natural second intermediate hosts of *Gnathostoma spinigerum*.

*Trichiniasis, etc.*—McNAUGHT (p. 848) shows that the great disparity in the United States between the figures of human trichiniasis diagnosed before and after death is evidence that detection of the infection in the

living is not simple. He calls attention to "splinter haemorrhages" seen beneath the nails during the migrating stage of the larvae and to the fact that the finding of eosinophilia is a useful clue if skin and precipitin tests establish that this is due to Trichinella rather than to some other cause. Parasites may also be found in blood, bile, stool, cerebrospinal fluid or biopsy material.

HALL (p. 846) reports that in the United States the incidence of human trichiniasis is between 10 and 20 per cent., according to post-mortem findings. Since people will not sterilize pork by proper cooking it is urged that packers, who buy the products of pig breeders, must buy only material which meets certain reasonable specifications. HOOD and OLSON (p. 847) found larvae of *T. spiralis* in the diaphragms of 16 per cent. of 428 human cadavers in Chicago. This proportion is near the 13 per cent. reported by other workers as an average for the United States.

SCHAPIRO *et al.* (p. 146) find a close correlation between the results of the Bachman skin test for trichiniasis and post-mortem findings in man, though the test is somewhat more valuable as a negative diagnostic measure than as a purely positive measure. For intradermal and precipitin tests BOZICEVICH (p. 847) reports a method of preparing the antigen from larvae separated from digested infected meat, dried, ground and extracted with neutral physiological saline. No preservative is added but the antigen is subjected to fractional sterilization and there is no loss of titre in six months. Each of 44 infected patients reacted to both tests.

In guineapigs ROTH (p. 146) found the site of election for Trichinella to be the caecum and neighbouring large and small intestine. The adults lived for 30 to 37 days in the small intestine and for 42 to 55 days in the caecum. He (p. 147) shows that in guineapigs, for each female Trichinella larva swallowed the number of encapsulated larvae recovered from muscle may vary from 300 to 2,400.

BACHMAN (p. 147) found that in pigs given repeated sublethal doses of trichinous meat there was marked eosinophilia accompanied by high precipitin titre after the first feeds but that these rapidly diminished after later feeds. It is suggested that the eosinophil cells may accumulate in the intestinal mucosa to form a bar to penetration by the larvae and that there is a local immunity produced by accumulation of antibodies and cells of the reticulo-endothelial system which wards off invasion by the worm and resorption of its toxic products. VAN SOMEREN (p. 849) describes the bone marrow of rats infected with Trichinella and refers to the eosinophilia observed in the blood during the acute phase and to the slighter but still persistent eosinophilia in the later phases.

CULBERTSON and KAPLAN (p. 148) find that protection against infection with *T. spiralis* is conferred in mice by passive transfer of a specific immune serum from rabbits. The action of the antibody appears to be directed specifically against the ingested larvae which are maturing to adult worms in the intestine and an immune serum would probably have little therapeutic value in the later stages of the disease.

VAN SOMEREN (p. 849) reviews the treatment of trichiniasis. Radium irradiation, catharsis, anthelmintics, organic arsenical drugs and certain miscellaneous drugs are useless and may be dangerous. Convalescent serum may control the toxic features and should be tried if available and there is evidence that the subcutaneous

injection of Carvasept (a preparation of thymol) in olive oil or gum arabic, or the oral administration of Butolan (Bayer) is lethal to a proportion of reproductive adults in rats. A clinical trial of the latter should be made. Excellent results have followed the intravenous injection of 5 cc. gluco-calcium (Lilly) during the migratory phase, and this therapy should be further tried. Calcification after encystment may be hastened by vitamin D and calcium administration and further trials of this method are indicated, but it is valueless before encystment has taken place.

FOSTER and JOHNSON (p. 850) show that if the eggs of *Capiliaria hepatica* are found in human faeces they have been ingested with food. The eggs are not visibly affected by cooking and occur not only in the liver of the rat and the dog, but also of the peccary and certain monkeys of Panama, which are used as food by the natives. WRIGHT (p. 155) working in the same area arrived at a similar conclusion.

*C. Wilcocks.*

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## RABIES.

### A REVIEW OF RECENT ARTICLES. XXXIII.*

#### i. *Virus.*

The characteristics of four strains of street virus isolated at the Pasteur Institute at Dakar (A.O.F.) have been examined by LÉPINE, MATHIS, and SAUTTER[1]. All four showed exalted virulence, but two of the four were mutable only with difficulty. The authors state that " nothing could be more dangerous than to allow the idea to take root that the normal rabies of A.O.F. was of the *oulou fato* type with attenuated virulence. On the contrary even in A.O.F., strains of exalted virulence resistant to experimental adaptation are met with."

At the Pasteur Institute at Shanghai, the fixed virus employed is a strain from Saigon *ex* Paris. The vaccine is prepared according to the original formula of FERMI. LIEOU[2] reports that during the period April 1938 to January 1939, this fixed virus, in the form of a vaccine phenolized at 22°C., when inoculated intraperitoneally into guineapigs, caused infection in two out of 10 instances. That this was a true rabies infection was confirmed by subpassage.

Further experiments by RAYNAL and LIEOU[3] gave similar results ; 5 out of 6, and 2 out of 3 guineapigs becoming infected with the Saigon strain. Using the Paris Pasteur Institute strain, 1 out of 6 rabbits, 8 out of 10 guineapigs, 7 out of 10 rats, and 10 out of 10 mice were infected by intraperitoneal inoculation. The Sassari strain (*ex* Paris)

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* For the thirty-second of this series see this *Bulletin*, 1940, Vol. 37, p. 191.

[1] LÉPINE (P.), MATHIS (Maurice) & SAUTTER (V.), Mlle. Sur quatre souches de virus rabique des rues, originaires de l'A.O.F.—*Bull. Soc. Path. Exot.* 1939. Nov. 8. Vol. 32. No. 9. pp. 852–856.

[2] LIEOU (Y. Ch.). Sur l'infection rabique du cobaye par la voie péritonéale.—*C. R. Soc. Biol.* 1940. Vol. 133. No. 2. pp. 194–196.

[3] RAYNAL (J. H.) & LIEOU (Y. Ch.). La voie péritonéale dans l'infection rabique expérimentale.—*C. R. Soc. Biol.* 1940. Vol. 133. No. 2. pp. 238–240.

appeared to be less active when introduced into the peritoneum, infection occurring in 0 out of 6 rabbits, 2 out of 10 guineapigs, 4 out of 10 rats and 5 out of 10 mice. It thus appears that the virulence of a fixed virus strain as judged by intra-cranial inoculation into the rabbit differs from that determined by intraperitoneal inoculation.

The survivors from the above experiments were tested by LIEOU[4] for immunity, the infecting dose being administered after 1 to 1½ months interval. In this experiment 4 out of 8 rabbits, and 3 of 4 guineapigs proved refractory to inoculation into the anterior chamber of the eye.

Slow desiccation over caustic potash causes loss of infectivity of rabies virus in 4 to 6 days, whilst after rapid desiccation *in vacuo* virulence may be maintained for from 3 to 4 or even more months. REMLINGER and BAILLY[5] find a very different state of affairs in the case of the AUJESZKY virus. After slow desiccation this virus retains virulence for 200 days, that is to say it is 50 times more resistant in this respect than rabies virus. On the other hand the two viruses do not differ when desiccation is rapid, both remain virulent for some 100 days. The authors suggest that this apparent paradox can be explained in terms of differing types of proteolytic ferments.

HOYT and WARNER[6] find that rabbit brain fixed virus rabies exhibits considerable resistance to the action of urea (60 per cent. of one-third saturated urea in normal saline to 40 per cent. fixed virus brain, incubated at 37°C. for 24 or 48 hours). "This virus maintained its antigenicity in four experiments and its infectivity in, at least, two tests in the presence of a concentration of urea which was sufficiently high to liquefy most of the virus-containing brain material."

Pseudorabies has already been observed in the Danube basin, Brazil, the United States, Holland, Denmark, Russia, France, Spain, Tunis, Turkey and Germany. REMLINGER and BAILLY[7] now add to that list Morocco, and the animal affected was a three months old Basset hound, born and bred in Algeria. It had lived under conditions which made it unlikely that infection could have been imported, and the authors "are forced to envisage the possibility of a spontaneous or *de novo* origin." The strain of virus in question presented no unusual features and did not differ from the classic type.

From observations on three strains of virus isolated at Coquilhatville (Belgian Congo), JADIN[8] finds that whilst the rabbit is difficult to infect with the virus of *oulou fato*, and the guineapig is even more so, white mice are receptive, and the virus may be fixed by subpassage in these animals with ease.

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[4] LIEOU (Y. Ch.). Immunité acquise contre la rage par vois péritonéale.—*C. R. Soc. Biol.* 1940. Vol. 133. No. 2. pp. 241–242.

[5] REMLINGER (P.) & BAILLY (J.). Action comparée des dessiccations lente et brusque sur les virus de la rage et de la maladie d'Aujeszky.—*C. R. Soc. Biol.* 1940. Vol. 133. No. 3. pp. 395–397.

[6] HOYT (Anson) & WARNER (Douglas). Urea-Treated Virus as a Vaccine against Rabies.—*Proc. Soc. Experim. Biol. & Med.* 1940. Jan. Vol. 43. No. 1. pp. 154–156.

[7] REMLINGER (P.) & BAILLY (J.). Premier cas marocain de la maladie d'Aujeszky.—*Bull. Acad. Méd.* 1940. Mar. 19 & Apr. 2. 104th Year. 3rd Ser. Vol. 123. Nos. 11 & 12. pp. 233–239.

[8] JADIN (Jean). Sensibilité de la souris blanche au virus rabique isolé à Coquilhatville.—*Arch. Internat. Méd. Expérim.* 1939. Dec. Vol. 14. No. 3. pp. 175–183. [10 refs.]

### ii. *Pathology.*

Experiments have been carried out by REMLINGER and BAILLY[9] on the presence of the viruses of rabies and pseudorabies in the various structures of the eye. The results were as follows :—Rabies virus was found in the retina (9 out of 10), the choroid (4 out of 8), the vitreous body (2 out of 5), and in the lens (1 out of 10) of infected animals. Aujeszky's virus was found only in the retina (6 out of 13), and the choroid (8 out of 9), whilst 16 tests of the vitreous and 16 of the lens gave negative results. Neither rabies nor Aujeszky's virus could be recovered from the aqueous humour. As this latter observation is contrary to the conclusion arrived at by other workers, the authors suggest that the positive results reported by others may have been due to a "paralytic or pseudo-paralytic syndrome caused by microbes from an agonal or cadaveric infection."

From a study of three cases of human rabies which occurred in spite of early treatment, the distribution and titre of the virus in various parts of the nervous system were determined by LEACH and JOHNSON[10]. The highest titre was $10^{-4}$ and was obtained from the anterior central gyrus, thalamus, pons, medulla, cervical cord, thoracic cord, and lumbar cord. Only in the thalamus was a titre of $10^{-4}$ found in all three cases. An interesting graph is given.

ROSENFELD and McDANIELS[11] report experiments which show that the heterophilic antibodies developed during rabies immunization with rabbit brain suspensions differ from the heterophilic antibody developed in true serum sickness, and from the heterophilic antibodies present in infectious mononucleosis. The rabies vaccine infections stimulate the formation of antibodies against the erythrocytes of sheep, rabbit and guineapig, the agglutinative titre showing a greater increase for red cells of guineapig and rabbit than of sheep—whilst in infectious mononucleosis and serum sickness there is a consistent increase in the sheep cell agglutinins, regardless of the increase for rabbit and guineapig cells.

### iii. *Methods of Treatment and Statistics.*

A ninth review of the data collected by the Health Section of the League of Nations (analysed by McKENDRICK[12]) relates to treatment during the two-yearly period 1936–37, and deals with a total of 304,525 persons. The mass total for the period covered by the nine reviews is 1,062,707. It appears to be generally accepted that the mode of preparation or of administration of Pasteur's attenuated virus (fixed

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[9] REMLINGER (P.) & BAILLY (J.). Sur la présence des virus rabique et pseudo-rabique dans les membranes et milieux de l'oeil.—*Ann. Inst. Pasteur.* 1940. Jan. Vol. 64. No. 1. pp. 40–46.

[10] LEACH (Charles N.) & JOHNSON (Harold N.). Human Rabies, with Special Reference to Virus Distribution and Titer.—*Amer. Jl. Trop. Med.* 1940. Mar. Vol. 20. No. 2. pp. 335–340. With 1 fig.

[11] ROSENFELD (Irene) & McDANIELS (H. E.). Heterophile Antibodies developed during Prophylactic Rabies Immunization.—*Proc. Soc. Experim. Biol. & Med.* 1939. Nov. Vol. 42. No. 2. pp. 640–643.

[12] McKENDRICK (A. G.). A Ninth Analytical Review of Reports from Pasteur Institutes on the Results of Anti-Rabies Treatment.—*Bull. Health Organisation.* (League of Nations.) 1940. Vol. 9. No. 1. pp. 31–78.

virus), has apparently little effect upon its immunizing properties provided that the dosage is accommodated. The only method that may be superior as an immunizing agent is that in which dilutions are used in mild cases, with the addition in severe cases of Alivisatos's vaccine, though the evidence in this direction is not strong. The statistics afford no definite evidence that when suitable dosage is employed, a living vaccine is more effective than a killed vaccine, and the risk of accident from treatment by the former is about three times as great as by the latter.

The evidence upon which these conclusions are based rests upon the following data.

| | Number treated | Deaths | | Mortality per cent. |
|---|---|---|---|---|
| | | observed | calculated* | |
| *Europeans.* | | | | |
| 1. Cords ... ... | 65,025 | 95 | 100 | 0·15 |
| 2. Dilutions ... | 73,364 | 125 | 113 | 0·17 |
| 3. Killed phenol ... | 81,555 | 135 | 126 | 0·17 |
| 4. Live phenol ... | 7,006 | 6 | 11 | 0·09 |
| 5. Fermi's vaccine | 17,723 | 23 | 27 | 0·13 |
| 6. Fermi's S.V. ... | 390 | 0 | 1 | 0 |
| 7. Heated ... ... | 140,959 | 258 | 217 | 0·18 |
| 8. Killed ether ... | 90,919 | 112 | 140 | 0·12 |
| 9. Mixed (*a*) ... | 57,227 | 65 | 88 | 0·11 |
| ,, (*b*) ... | 7,307 | 14 | 11 | 0·19 |
| ,, (*c*) ... | 6,646 | 8 | 10 | 0·12 |
| 10. Yatren ... ... | 5,384 | 13 | 8 | 0·24 |
| Total ... | 553,505 | 854 | 852 | 0·15 |
| *Non-Europeans.* | | | | |
| 1. Cords ... ... | 80,952 | 423 | 452 | 0·52 |
| 2. Dilutions ... | 1,777 | 16 | 10 | 0·90 |
| 3. Killed phenol ... | 383,955 | 2,194 | 2,144 | 0·57 |
| 4. Fermi's vaccine | 9,601 | 26 | 54 | 0·27 |
| Total ... | 476,285 | 2,659 | 2,660 | 0·56 |

* Calculated from the total mortality.

Mixed (*a*) = dilutions plus in severe cases Alivisatos.

Mixed (*b*) = dried cords plus in severe cases Fermi's vaccine.

Mixed (*c*) = Fermi plus in severe cases Alivisatos.

It may be said in general terms that with regard to the treatment methods—cords, dilutions, killed phenol, live phenol (Puntoni), Fermi's original method, heated vaccines and killed ether vaccines—it is unlikely that a difference of efficiency of more than some 25 per cent. between any two of these methods exists.

As regards accidents due to treatment there is however wide diversity.

| | Number treated | Accidents | | Percentages | | |
|---|---|---|---|---|---|---|
| | | Total | Fatal | Total | Fatal | Non-Fatal |
| 1. Cords ... ... | 152,899 | 45 | 5 | 0·029 | 0·003 | 0·024 |
| 2. Dilutions ... ... | 75,141 | 24 | 17 | 0·031 | 0·018 | 0·013 |
| 3. Killed phenol ... | 488,795 | 55 | 14 | 0·011 | 0·003 | 0·008 |
| 4. Live phenol ... | 7,006 | 0 | 0 | 0 | 0 | 0 |
| 5. Fermi's Vaccine ... | 28,159 | 4 | 3 | 0·014 | 0·011 | 0·003 |
| 6. Fermi's S.V. ... | 390 | 0 | 0 | 0 | 0 | 0 |
| 7. Heated ... ... | 140,959 | 8 | 2 | 0·006 | 0·001 | 0·005 |
| 8. Killed ether ... | 90,919 | 9 | 4 | 0·010 | 0·004 | 0·006 |
| 9. Mixed (*a*) ... ... | 57,227 | 28 | 3 | 0·049 | 0·005 | 0·044 |
| ,, (*b*) ... ... | 7,307 | 2 | 0 | 0·027 | 0 | 0·027 |
| ,, (*c*) ... ... | 6,646 | 3 | 0 | 0·045 | 0 | 0·045 |
| 10. Yatren ... ... | 5,384 | 3 | 0 | 0·056 | 0 | 0·056 |
| Total ... | 1,060,832 | 181 | 48 | 0·017 | 0·005 | 0·012 |

and this table is further summarized as follows :—

| | Number treated | Total accidents | | Fatal | Percentages | | |
|---|---|---|---|---|---|---|---|
| | | observed | calculated | | Total | Fatal | Non-Fatal |
| 1. Killed vaccines ... | 579,714 | 64 | 99 | 18 | 0·011 | 0·003 | 0·008 |
| 2. Live vaccines ... | 299,580 | 99 | 51 | 25 | 0·033 | 0·008 | 0·025 |
| 3. Heated vaccines ... | 140,959 | 8 | 24 | 2 | 0·006 | 0·001 | 0·005 |
| 4. Other ... ... | 40,579 | 10 | 7 | 3 | 0·025 | 0·007 | 0·018 |
| Total ... | 1,060,832 | 181 | 181 | 48 | 0·017 | 0·005 | 0·012 |

From which it appears that the occurrence of accidents—fatal and non-fatal—is about three times as great with living vaccines as with killed vaccines—and that heated vaccines are even safer.

A second section of this review deals with rabies treatment in the U.S.S.R. during the years 1935–37. The data are not very satisfactory, but they bear out in general the conclusions of the main report.

In a comprehensive article dealing in turn with practically all of the problems which arise in antirabies treatment, Proca and Bobes[13] compare the results of treatment at Bucharest with those obtained from other institutes as given in the 8th League of Nations review. The field covered is so great and the subject matter so diverse that it cannot be given in detail in this review ; but the system employed by these authors, of comparing the statistics of their own institute, under each heading of the schedule issued by the League, with those obtained with other methods of treatment and at other institutes,

[13] Proca (G.) & Bobes (S.). Anti-Rabic Immunisation : Living Vaccines and Killed Vaccines.—*Bull. Health Organisation.* (League of Nations.) 1940. Vol. 9. No. 1. pp. 79–130. [Refs. in footnotes.]

as given in the League of Nations reviews, is exactly what was in the minds of those who at the Paris Conference formulated the resolution which led the Health Section of the League to collect and analyse all the available data. Step by step the authors are led to the conclusion that there seems to be no valid reason for having recourse to live vaccines and accepting the risks which they involve. "In these circumstances should live vaccines be abandoned and chemical vaccines used exclusively? Or would it be sufficient to define more exactly the indications and contra-indications of live vaccines? An International Rabies Conference could alone decide this point with the necessary authority and competence." [It was, I understand, the intention of the League to hold such a conference about this time, but circumstances have not proved favourable, and I am afraid each director will have to decide the question on his own initiative.]

A critical review of published data on the immunizing potency of antirabies vaccines, as estimated by animal experiments, is furnished by WEBSTER[14]. "Only those experiments have been considered which are suitable for at least a crude statistical analysis, omitting for the most part reports without protocols, without controls, and at least five test animals per experiment." This comprehensive compilation of results is a very valuable contribution to the literature of rabies. Detailed tables are given referring to pre-infectional and post-infectional immunization. The conclusions which the author arrives at from his study may best be stated in his own words.

"First, all workers, save FERMI, have failed to demonstrate a significant protective effect of vaccination following experimental exposure to rabies virus by any route. FERMI alone, working with rats, vaccinated them successfully against virus given subcutaneously, provided at least 50 per cent. of their body weight of vaccine in multiple doses was employed. No one has confirmed this report. Second, vaccine, virulent or non-virulent, given before exposure, has generally been found effective against test virus only under the following limited conditions: (*a*) the test virus must be given peripherally rather than centrally into the nervous tissue and in amounts fatal to less than 100 per cent. of controls, (*b*) the vaccine employed must be given in multiple doses and in large amounts, at least 1 per cent. of the body weight. Apparently FERMI was the first to offer convincing evidence of successful prophylactic vaccination, and REMLINGER, STUART and KRIKORIAN, KELSER, and SHORTT (*et al*) presented ample confirmatory data. The results of experiments in general are irregular and show not only relatively meagre immunizing power of vaccines but little superiority of one preparation or procedure over another. The results of this survey of the literature led us to study the possibility of developing a quantitative and practical potency test with mice as the test animals."

In a second paper (very similar to that already reviewed in this *Bulletin*, 1940, Vol. 37, p. 194), WEBSTER[15], starting from the consideration that "no quantitative or standardized method of testing vaccines has as yet been developed," goes on to describe his mouse test, and repeats the results which were summarized in my previous review. He concludes for his veterinary readers as follows:—

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[14] WEBSTER (Leslie T.). The Immunizing Potency of Antirabies Vaccines. A Critical Review.—*Amer. Jl. Hyg.* 1939. Nov. Vol. 30. No. 3. Sect. B. pp. 113–134. [25 refs.]

[15] WEBSTER (Leslie T.). A Mouse Test for measuring the Immunizing Potency of Antirabies Vaccines.—*Jl. Amer. Vet. Med. Assoc.* 1940. Jan. Vol. 96. No. 754. pp. 65–73. With 1 chart.

"We submit the mouse test as a practical, reliable measure of the immunizing potency of prophylactic vaccines for dogs and point out that this test has shown phenolized, single injection, canine vaccines to be lacking in immunizing potency. Further studies on the administration of chloroformized vaccines in larger amounts and by different routes, plus studies on still different types of vaccines, are in progress with a view to developing, if possible, an effective, specific method for the prophylactic immunization of animals against rabies."

The question as to the most suitable vaccine to be employed for decentralized treatment in tropical climates is discussed by GIRARD and MILLIAU[16]. Experiments using the original vaccine of FERMI, the incubated phenol vaccine of SEMPLE, and the classic dried cord method yielded the following results. The vaccine of FERMI protected 16 out of 18 animals (88·8 per cent.), that of SEMPLE protected 11 out of 17 (64·7 per cent.), and dried cords protected 14 out of 18 (77 per cent.). The authors, in spite of the fact that these differences are quite insignificant (the greatest difference would be expected as the result of mere chance once in eleven trials) conclude that only the FERMI vaccine should be used in Madagascar, and are met with the obvious difficulty that it must be stored in a refrigerator. Statistics from Madagascar are submitted to the League of Nations, and the authors should be aware of the statistical reviews which have been published by that body. The results obtained there show no evidence of superiority of any one of those methods which they have employed, and their own experiment is in conformity with this conclusion.

On the occasion of the 50th anniversary of the Antirabic Institute at Rome, PUNTONI[17] reviews its activities, with particular reference to the large degree of decentralization which now has taken place. The number of dispensaries has increased from 1 in 1923 to 36 in 1939.

The statistics of treatment at Kuala Lumpur for the year 1938 are detailed by LEWTHWAITE[18].

### iv. *Post Vaccinal Paralysis and Other Accidents.*

The case of a person who exhibited symptoms of syncope, vomiting, and loss of consciousness for a period of 2½ hours after inoculation with 5 per cent. phenol vaccine is reported from Hanoi by BERNARD[19].

A critical note on this case is presented by LÉPINE[20], who states that this form of accident occurs more frequently with phenol than with other vaccines, and is inclined to the view that it is an anaphylactic phenomenon, and not a phenol effect.

A somewhat similar case in which after the 11th injection the patient suddenly lost consciousness and suffered from a transient paresis is

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[16] GIRARD (G.) & MILLIAU (M.). Décentralisation du traitement antirabique et vaccins phéniqués.—*Bull. Soc. Path. Exot.* 1940. Feb. 14. Vol. 33. No. 2. pp. 137–139.

[17] PUNTONI (V.). Cinquant'anni di attività dell'Istituto Antirabbico di Roma.—*Ann. d'Igiene.* 1940. Jan. Vol. 50. No. 1. pp. 17–24.

[18] FEDERATED MALAY STATES. ANNUAL REPORT OF THE INSTITUTE FOR MEDICAL RESEARCH FOR THE YEAR 1938.—[Rabies. pp. 131–136. LEWTHWAITE (R.).]

[19] BERNARD (P.). Incident au cours du traitement antirabique.—*Bull. Soc. Path. Exot.* 1939. Oct. 11. Vol. 32. No. 8. pp. 799–800.

[20] LÉPINE (P.). A propos des accidents syncopaux au cours du traitement antirabique.—*Bull. Soc. Path. Exot.* 1939. Oct. 11. Vol. 32. No. 8. pp. 800–802.

reported by NOURY[21] from Morocco. He believes that the condition was due to arterial spasm, and states that such sequelae were never observed after treatment by the dried cord method.

A similar statement is made by RAYNAL and LIEOU[22], who describe the syndrome of symptoms which they have on rare occasions observed after treatment with phenol vaccines, as being characterized by pain in the head, vertigo, syncope, cyanosis of the face, profuse sweating, stertorous breathing, tonic and clonic movements of the limbs, and involuntary micturition. They believe these symptoms to be those of shock due to phenol. Experimentally they failed to reproduce the syndrome when inoculation was subcutaneous, but when the intraperitoneal path was used, they have observed convulsive crises after two or three inoculations. They believe that the phenol is the responsible factor.

The prevalence of these phenomena is also discussed by BÉGUET and HORRENBERGER[23].

### v. *Rabies in Animals.*

An interesting survey of the prevalence of rabies, as judged by experimental inoculation, amongst animals in Birmingham (Alabama, U.S.A.) is reported by DENISON and LEACH[24, 25]. Of 352 dogs suspected of rabies, 232 gave a positive result. Of 533 not suspected to be rabid, 5 were positive (0·9 per cent.). Of a further 477 " brought to the city incinerator by the dead wagon, which died at home, on the streets or were killed in traffic," 25 (5·2 per cent.) were positive. The authors conclude that " undiscovered or unsuspected rabies in dogs greatly exceeds the recorded incidence." A collateral examination of rats showed that of 500 trapped in various locations none were positive.

Two cases diagnosed as pseudorabies are described by FINKELSTEIN[26], one of a horse and one of a terrier.

### vi. *Miscellaneous.*

A general article on the diagnosis and control of rabies in South Africa is presented by THOMAS[27]. He states *inter alia* that the introduction by WEBSTER and DAWSON of the white mouse as a test animal has caused " an appreciable simplification of the work, and what is

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[21] NOURY (M.). Un cas d'hémiparésie transitoire au cours du traitement antirabique par vaccin phéniqué.—*Bull. Soc. Path. Exot.* 1940. Jan. 10. Vol. 33. No. 1. pp. 4–5.

[22] RAYNAL (J. H.) & LIEOU (Y. Ch.). Choc expérimental par solutions phéniquées faibles.—*C. R. Soc. Biol.* 1940. Vol. 133. No. 2. pp. 242–244.

[23] BÉGUET (M.) & HORRENBERGER (R.). Résultats d'une enquête sur les incidents observés au cours de la vaccination antirabique par le vaccin phéniqué.—*Bull. Soc. Path. Exot.* 1940. Apr. 10. Vol. 33. No. 4. pp. 230–232.

[24] DENISON (George A.) & LEACH (Charles N.). Incidence of Rabies in Dogs and Rats as determined by Survey.—*Amer. Jl. Public Health.* 1940. Mar. Vol. 30. No. 3. pp. 267–269. With 1 fig.

[25] DENISON (George A.) & DOWLING (J. D.). Rabies in Alabama. [Correspondence.]—*Jl. Amer. Med. Assoc.* 1940. Jan. 6. Vol. 114. No. 1. pp. 76–77.

[26] FINKELSTEIN (B. J.). Infectious Bulbar Paralysis (=Mad Itch).—*Jl. Amer. Vet. Med. Assoc.* 1940. Jan. Vol. 96. No. 754. pp. 99–100.

[27] THOMAS (A. D.). Progress in the Diagnosis and Control of Rabies.—*South African Med. Jl.* 1939. Nov. 25. Vol. 13. No. 22. pp. 763–765.

more important, a considerable shortening of the time taken to arrive at a positive as well as a negative diagnosis." After enumeration of the various animals which are known to be carriers of rabies in South Africa, he goes on to describe measures for controlling the epizootic.

During the course of propagating rabies virus in tissue culture, a strain of lymphocytic chorio-meningitis virus has been encountered by CASALS-ARIET and WEBSTER[28]. It grows readily on "mouse embryo-serum-Tyrode" culture media, and appears to have had its origin in the mouse brain or more probably the monkey serum. The identity of the virus was established by cross immunity and neutralization tests. Filtration tests gave clear cut results, and determined the size of the virus as 30 to 50 $m\mu$.

KELLOGG[29] in a letter to the Editor of the *Journal of the American Medical Association*, emphasizes the importance of cauterization.

*A. G. McKendrick.*

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[28] CASALS-ARIET (J.) & WEBSTER (L. T.). Characteristics of a Strain of Lymphocytic Choriomeningitis Virus encountered as a Contaminant in Tissue Cultures of Rabies Virus.—*Jl. Experim. Med.* 1940. Feb. 1. Vol. 71. No. 2. pp. 147–154. [10 refs.]

[29] KELLOGG (W. H.). Treatment of Bites of Rabid Animals. [Correspondence.] —*Jl. Amer. Med. Assoc.* 1940. Mar. 9. Vol. 114. No. 10. p. 910.

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## LEPROSY.

### *PRÉCIS* OF ABSTRACTS IN THIS SECTION.

BRIERCLIFFE (p. 624) estimates that in Nigeria the incidence of leprosy is 10 per 1,000. The voluntary system of segregation practised in Nigeria has been successful and the settlements are being increased as funds become available. DAVEY (p. 625) urges further research in leprosy institutions and LANGAUER (p. 625) shows that the survey-propaganda-treatment system has been successful in winning the confidence of the people.

In the Saidapet report (p. 625) it is once more emphasized that contact with an open case affords the greatest risk of infection. In the village of Mambalam (p. 625) where 28 definite cases were found in 1,103 persons, extra-familial infection was important but it is stated that the whole village may be regarded as a family group. AUSTIN (p. 626) shows that in Fiji the distribution of cases depends essentially on the density of the population, and has shown no material change since 1911. He stresses the importance of family contact examination. HOPKINS (p. 626) discusses hereditary resistance to leprosy and considers that in Hawaii the rapid spread has been due to lack of this resistance in the natives.

GEHR (p. 626) discusses the sapotoxin-containing foods in relation to leprosy in New Zealand.

BOENJAMIN (p. 627) gives information relating to the incidence of the disease and the condition of lepers in Batavia.

DOULL and MEGRAIL (p. 627) report the development of lesions in the Syrian hamster, previously subjected to splenectomy, and inoculated with leprosy bacilli.

In the Report of the Medical Research Council (p. 628) is a suggestion by LAIDLAW that as material received from a human case in the Congo produced rapidly spreading lesions in rats, the original infection may have been due to the rat leprosy bacillus and, further, that human leprosy in general may have arisen from rat leprosy, the bacilli having become modified by adaptation to human tissues.

OTA and SATO (p. 628) found results in hens inoculated with human or rat leprosy bacilli which indicated that multiplication had taken place, together with more characteristic macroscopic and microscopic changes than are found in other experimental animals.

DHARMENDRA and MUKHERJI (p. 628) failed to find any attenuating action by methylene blue on the rat leprosy bacillus either *in vitro* or *in vivo*.

ERMAKOVA (p. 629) describes the histo-pathology of three types of simple leprid lesions of anaesthetic and maculo-anaesthetic leprosy. REENSTIERNA (p. 629) discusses the histological resemblance between cutaneous leprosy and the lesions of the Besnier-Boeck and Schaumann diseases.

CONCEPCION *et al.* (p. 630) find that the blood ascorbic acid in leprosy is reduced in proportion to the severity of the disease.

MANALANG (p. 630) advocates staining by the Cooper method in preference to the Ziehl-Neelsen in suspicious cases, since 28 per cent. more positives are given by the former.

RODRIGUEZ *et al.* (p. 630) describe three cases in which lepromatous changes occurred in lesions of the macular type.

WADE *et al.* (p. 631) describe the clinical features and course of tuberculoid leprosy, showing that there is no fundamental type differentiation between the major tuberculoid lesions and those of the lesser forms of neuromacular leprosy. Spread may occur by extension and not necessarily by metastasis, but there may be a secondary eruption, papular or macular, which is apparently due to metastatic dissemination. The frequent persistence of bacilli in the tuberculoid lesions and the frequent relapses render the ultimate prognosis uncertain. STEIN (p. 631) states that tuberculoid lesions are the expression of a peculiar allergic condition accompanied by strongly developed immunity.

FERNANDEZ (p. 632) states that with the lepromin test there is an allergic reaction which may be seen after 48 hours as well as the late result in the third or fourth week. In 95 per cent. of cases the early and the late reactions agree. LARA (p. 632) shows that the lepromin test may be positive in children under one year of age, but some of these positive results may be the result of previous negative tests. Early leprotic lesions in the children were associated with undiminished tendency to react positively and the duration and constancy of exposure to infection appeared to bear a direct relation to the proportion of positive reactions. MOISER (p. 633) reports on the potassium iodide test in leprosy.

PUPO (p. 633) discusses the classification of leprosy.

MOISER (p. 633) obtained the best results in the treatment of leprosy, over a period of 10 years, with Moogrol. MONTEL (p. 634) describes a method of treatment with methylene blue combined with ozonized oxygen administration. ZANETTI (p. 634) recounts the results obtained with Neo-solganal, and DE GOLOVINE (p. 634) reports favourably on another gold preparation, Auro-detoxin.

HOU (p. 635) shows that in leprosy the urinary excretion of vitamin $B_1$ is far below normal but may be raised by oral administration. He therefore advises that vitamin $B_1$ should be given especially in cases where neuritis is present.

GERMOND (p. 635) uses Fouadin for the treatment of lepra reactions and has had success with drugs of the Prontosil group for the same purpose.

COCHRANE (p. 635) describes the treatment used by him for trophic ulcers. RYRIE (p. 636) refers to the excellent effect of dressings containing vitamin A on the ulcers of leprosy and gives details of the preparations he uses, including shark liver oil.

DELINOTTE (p. 636) describes the measures taken against leprosy in the French colonies. These rely largely on isolation in institutions or in the homes, treatment especially with chaulmoogra preparations, and propaganda. In the Belgian Congo (p. 637) almost 15,000 lepers are isolated in leprosaria. BARRETO (p. 637) gives information about the national campaign against leprosy in Brazil. *C. W.*

i. MONEY (T. D. F.). **The Enugu Leprosy Conference.**—*Leprosy Review.* 1940. Apr. Vol. 11. No. 2. pp. 79–83.
ii. BRIERCLIFFE (Rupert). **Leprosy in Nigeria.**—*Ibid.* pp. 84–89.
iii. DAVEY (T. F.). **Problems for Research Work in Leprosy Institutions.**—*Ibid.* pp. 90–95.
iv. LANGAUER (L.). **Leprosy in Benin and Warri Provinces of Nigeria.**—*Ibid.* pp. 96–99.

This conference of Nigerian Leprosy workers from 14 settlements was held in August 1939 with the help of the Nigerian Government and of the British Empire Leprosy Relief Association, who were represented by Dr. E. Muir, and appears to have been a great success.

i. Dr. Money spoke on difficulties and needs of the work.

ii. Sir Rupert Briercliffe, Director of the Nigerian Medical Service, gave an instructive account of the magnitude and difficulties of the leprosy campaign in that country. The number of lepers, some 200,000, at least 10 per mille of the population, was probably only exceeded in numbers by those of India and China. A leprosy ordinance of 1916 was practically a dead letter, and real progress in tackling the problem began about 1926 with the work of Dr. Macdonald at Itu, and with the visit of the secretary of B.E.L.R.A. Dr. Muir's first visit in 1936 led to further advances regarding this major public health problem. Both the administrative and medical sections of the government have done all they could to help, the government annual grant being £5,000, and there are now 14 settlements in the 23 provinces. "The success of the voluntary system of segregation as practised in Nigeria is evidenced by the constantly increasing demand for admission to the settlements." The number of inmates has increased from 2,500 ten years ago to nearly 7,000, and would be much larger if money was available. The annual cost per case in the settlements varies from about £3 to £5, and depends on its size and the extent to which it has become self-supporting through the agricultural and other work of the patients. Twelve Toc H workers are employed in the colonies, which are mostly under administration of medical missionaries. Valuable surveys are being carried out together with propaganda and treatment. The taxation per annum per head of population only amounts to 5s. 10d. and nearly 4 per cent. of medical and health

expenditure is on leprosy, the total expenditure by Government and the Native Administration having risen from less than £8,000 in 1928 to nearly £20,000 in 1938, but even this is only about 2s. per head of cases. The fight will be a long one, but good progress is being made.

iii. Dr. T. F. Davey spoke on research work in leprosy institutions. He urged further clinical studies and laboratory investigations to decide which cases are dangerously infective, especially those with diffuse bacillary invasion of the skin. The lepromin test may also be of use, but it has not yet been tried in Nigeria. Periodic variations in resistance according to the seasons of the year might be investigated by means of the sedimentation test. Diet in leprosy is also important.

iv. Dr. Langauer deals with the difficulties met with in starting the Ossiomo settlement in Nigeria. It took time to win the confidence of the people, but this was gradually overcome through the survey-propaganda-treatment method, and now some cases have to be refused admission. There are 62 paying patients, and the total number is expected soon to rise to 500.

Unanimous resolutions of the conference emphasized the following points. Open cases constitute the greatest danger and healthy persons, especially children, should be saved from contact with them. Surveys are only desirable if associated with offers of treatment. Research is required into what comprises individual resistance to the disease. The education department should arrange for instruction on leprosy, including visits to leper colonies. *L. Rogers.*

SAIDAPET HEALTH PROJECT. THE SECOND PROGRESS REPORT. 1939. Aug. pp. 16–23. With 1 fig.—**Report of the Silver Jubilee Clinic for the Study of Child Leprosy.**

This clinic, started by Dr. Cochrane, is becoming increasingly popular. The results are shown in tables, and a survey brings out the importance of contact with open cases as affording the greatest risk of infection. Benign forms tend to become spontaneously arrested. The addition of skimmed milk to the diet of the children had little effect on early lesions, but may be beneficial in lepromatous cases. Maximum doses of hydnocarpus oil appeared to cause more rapid improvement. In one village survey every definite case was shown to have had contact with an open case. *L. R.*

SAIDAPET HEALTH PROJECT. THE SECOND PROGRESS REPORT. 1939. Aug. pp. 24–29. With 1 plan.—**Preliminary Report of the Leprosy Survey of the Mambalam Village. May, 1939.**

This is a survey of a small slum village peopled by a single community of the " depressed " coolie class, with poor economic conditions. Among 1,103 persons examined 28 definite cases of leprosy were found and 13 doubtful ones. As usual males suffered twice as much as females. It was in this village that new cases were regularly traced to contact with open ones, and 14 were traced to two deceased open cases and 6 to existing open ones. In the majority the source of infection was extra-familial, although this is contrary to other findings at this clinic in which room contact was more important. The explanation appears to be that in this single community the whole village can be taken as a family group. *L. R.*

AUSTIN (C. J.). **Report on Central Leper Hospital, Makogai.**—*Fiji Ann. Med. & Health Rep. for Year 1938.* pp. 32–37. With 3 plates (2 maps).

This interesting report shows that even under a compulsory system a leper institution of the agricultural type may enable the co-operation of the patients to be obtained without any sense of grievance. During 1938 the patients increased from 577 to 619, the Cook and Gilbert Islands supplying 81 out of 135 new admissions. A spot map shows the distribution in the Fiji Islands, and a genealogical tree traces 58 cases in one family group. Indians form the largest numbers and show more lepromatous cases. The distribution of cases depends essentially on the density of the population, and shows no material change since 1911. The importance of examining family contacts is stressed. Diet is good and much food is grown by the inmates. During the year 53 patients were discharged as arrested after being negative for two years, 11 being lepromatous cases in stages 1 and 2. Warmed hydnocarpus oil with 0·5 per cent. iodine is used. In addition 62·7 per cent. of the cases improved, including 70 and 51 per cent. of L1 and L2 cases, respectively, but only 10 per cent. of L3. *L. R.*

HOPKINS (Ralph). **Heredity in Leprosy.**—*Internat. Jl. Leprosy.* Manila. 1940. Jan.–Mar. Vol. 8. No. 1. pp. 71–80. With 3 charts.

This experienced leprologist comes to the following conclusions regarding heredity in leprosy. It is possible that Europeans have acquired a high degree of resistance to leprosy. The rapid and extensive spread of the disease in Hawaii occurred in a people lacking hereditary resistance. In Louisiana Negroes have more resistance than Caucasian races. Inherent feminine characteristics account for their greater resistance. The infection of family groups may be due to lack of resistance. *L. R.*

GEHR (Emmo). Ist die Reinigung des Brotgetreides von Kornradesamen mitbeteiligt am Erlöschen der mittelalterlichen Lepra? [**The Purification of Cereal Foods in Relation to the Decline of Leprosy in the Middle Ages.**]—*Ztschr. f. Hyg. u. Infektionskr.* 1939. Oct. 21. Vol. 122. No. 2. pp. 238–248. [67 refs.]

——. Lepra und Ernährung auf Neuseeland. [**Leprosy and Food in New Zealand.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1940. Feb. Vol. 44. No. 2. pp. 73–78. With 1 fig. [31 refs.]

These two papers discuss the modern hypothesis that sapotoxin-containing foods predispose to leprosy, in the light of former literature regarding the decline of leprosy in Europe after the middle ages, and among the Maoris of New Zealand more recently. It is suggested that in Europe the corn cockle, and in New Zealand Colocasia (yams), contained the toxic agent, and purer grains in Europe, and the introduction of the potato into New Zealand, coincided with the decline of the disease in the respective areas. Numerous references are given which will enable those interested to follow up the subject. [It should be pointed out that some authorities doubt if leprosy was prevalent among the indigenous population of New Zealand, and think that syphilitic cases were wrongly diagnosed as leprosy.] *L. R.*

BOENJAMIN (R.). Enkele gegevens over het voorkomen van lepra in de Gemeente Batavia. [**The Incidence of Leprosy in Batavia.**]—*Geneesk Tijdschr. v. Nederl.-Indië.* 1940. Feb. 6. Vol. 80. No. 6. pp. 322–333. With 2 figs. English summary.

"In the period from January 1936 till the end of June 1939 a number of 465 lepers was registered in the Queen Wilhelmina Institute for Leprosy Research at Batavia, 415 of whom were residents of the municipality. The registration concerns principally the voluntary attendance of lepers in our treatment-department—the systematic research of native quarters being only in the beginning—and for several reasons it does seem justified to estimate the total number of manifest lepers in Batavia at 1,000 at the least (2‰). In 223 of those 415 known leprous residents the general condition of health seems outwardly as good as that of the native population in the same age-groups. In 154 others the general condition seems equally good, but on account of well visible signs of the disease (97) or disabled limbs (57) a normal place in the society is not available for them. The number of bedridden invalids is 8—apart from 2 blind and 2 deaf lepers—and the number of leprous children, forbidden to visit the schools, amounts to 26. Out of 196 adult male lepers 109 carry on a trade, further specified in the text. The sex-ratio and the age-distribution needs no discussion; the same holds good for the clinical differentiation in types and the results of the bacterioscopical examinations."

RODRIGUEZ (Jose N.). **The Importance of Epidemiological Studies of Leprosy.**—*Monthly Bull. Bureau of Health.* Manila. 1939. Aug. Vol. 19. No. 8. pp. 323–327.

This brief note points out that in the Philippines only the province of Cuba has been adequately surveyed for leprosy cases and further field studies are required. *L. R.*

LUTZ (Adolpho). **The Transmission of Leprosy by Mosquitos and its Prophylaxis.**—*Mem. Inst. Oswaldo Cruz.* 1939. Vol. 34. No. 4. pp. 485–493. [Portuguese version pp. 475–484.]

i. DOULL (James A.) & MEGRAIL (Emerson). **Inoculation of Human Leprosy into the Syrian Hamster.**—*Internat. Jl. Leprosy.* Manila. 1939. Oct.-Dec. Vol. 7. No. 4. pp. 509–512. With 4 figs. on 2 plates.

ii. LAIDLAW (Patrick). **Maintenance of the Golden Hamster.**—*Ibid.* pp. 513–516.

i. This is a brief report of the results of splenectomy, followed by intraperitoneal and subcutaneous injections of lepra bacilli into the Syrian or Golden Hamster. Most of the animals showed no palpable lesions after several months, but one animal developed a pea-sized subcutaneous nodule at the site of injection, which on removal on the 63rd day showed numerous acid-fast bacilli. No recurrence followed its removal. The inoculation of part of the nodule into another animal resulted in an infection of the right eye and a local thickening of the skin showing after death of the hamster numerous acid-fast rods. A description of the golden hamster and of methods of breeding is added.

ii. This paper by Sir Patrick Laidlaw [whose recent decease is a great loss to medical science] records his experience in keeping and breeding hamsters, which will be of value to workers on leprosy animal inoculations. *L. R.*

MEDICAL RESEARCH COUNCIL. REPORT OF THE MEDICAL RESEARCH COUNCIL FOR THE YEAR 1938–1939 [BALFOUR OF BURLEIGH, Chairman]. Cmd. 6163. [**Leprosy** pp. 43–44.]

In this section reference is made to the work of Sir Patrick LAIDLAW. Human leprosy material from the Belgian Congo had been inoculated by DUBOIS in Antwerp into Syrian hamsters. One of the hamsters became infected and LAIDLAW, working with material from it, found that a rapidly spreading infection could be transferred with ease not only to hamsters but also to white rats. This fact, together with observations made on the tissues of the animals suggested to LAIDLAW that the lesions from which the material was originally obtained were due to infection with the organism of rat leprosy and not to the usual human type, an opinion shared by DUBOIS and by ADLER, to whom specimens were sent. The clinical condition in the patient from whom the material was obtained had apparently aroused no suspicion of origin from the rat leprosy bacillus.

"The question naturally arises whether human leprosy, in general, may have originated by infection from the more rapidly spreading and more widely prevalent rat disease, the bacilli subsequently losing their pathogenicity for the rat with adaptation to the human tissues." [See also this *Bulletin*, 1939, Vol 35, p. 293.] *C. W.*

OTA (Masao) & SATO (Saburo). **Inoculation Experiments of Human and Rat Lepra in the Hen.**—*Internat. Jl. Leprosy.* Manila. 1940. Jan.–Mar. Vol. 8. No. 1. pp. 81–85.

The results of inoculations with rat and human leprosy bacilli into hens, killed after six to eight months, are recorded. The injections were made into the breast muscles, in which after death were found yellowish circumscribed indurations up to the size of a sparrow's egg. Histologically these showed "colossal" numbers of acid-fast bacilli, which could not be cultivated on media favourable to tubercle bacilli. Granulation tissue, epithelioid cells and large lepra cells filled with bacilli, and also containing fat globules, were found. It was too early for generalization, but a few bacilli were found in the liver and spleen in some animals. The lesions were very similar after both rat and human bacillary injections, and the authors consider that multiplication of the organisms had occurred, together with more characteristic macroscopic and microscopic changes than in other experimental animals. *L. R.*

DHARMENDRA & MUKHERJI (N. N.). **Action of Methylene Blue on** *Mycobacterium leprae muris.*—*Indian Jl. Med. Res.* 1940. Jan. Vol. 27. No. 3. pp. 627–630.

The authors conclude from their tests that *in vitro* methylene blue has no attenuating effect on *Myco. leprae muris*, so they were unable to confirm BERNY's findings. Nor did the stain have any action on the acid-fast property of the bacilli. *In vivo* equally negative results were obtained, contrary to the findings of MARCHOUX and CHORINE. [See this *Bulletin*, 1935, Vol. 32, p. 546.] *L. R.*

ERMAKOVA (N.). **The Histopathology of Simple Leprids.**—*Internat. Jl. Leprosy.* Manila. 1939. Oct.–Dec. Vol. 7. No. 4. pp. 495–508. With 8 figs. on 2 plates.

This is a detailed description, illustrated by two plates, of the microscopic appearances of three types of simple leprid lesions of anaesthetic and maculo-anaesthetic leprosy.

(*a*) Anaesthetic (nonmacular, polyneuritic), symbol Na. Five cases of this group showed analgesia limited to the macules, which microscopically did not differ from banal chronic inflammation. Lymphoid cells mixed with epithelioid cells were found accumulated around cutaneous blood vessels and especially around nerve branches in a muff-like arrangement, with destruction of the elastic tissue. The bacilli were mainly found in the nerve branches.

(*b*) Flat, pale (depigmented) macules. Fifteen cases in this group showed polyneuritis with loss of all kinds of sensation in addition to macules. Inflammatory changes were found along the course of the nerves and blood vessels, consisting of round cells and a few epithelioid cells with some fibrosis of the nerves, which contained granular and bipolar staining bacilli.

(*c*) Tuberculoid macular (minor and major), symbol Nt. Four cases in this group showed well marked disturbance of sensation in the macules. Microscopically perivascular and perineural round cell accumulations, with an admixture of epithelioid ones, but no giant cells were found, with no tendency to form separate foci or cords. Lepra bacilli were concentrated in the nerves. The skin showed an atrophic condition and fibrosis, and cicatricial changes were present in the nerves. The whole series of cases therefore revealed a banal chronic inflammation with clinical manifestations of simple leprids and polyneuritis. *L. R.*

OBERDÖRFFER (Manfred). Histologische Untersuchungen an Lepraflecken in Nigeria. [**Histology of Lepra Macules.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1939. Sept. Vol. 43. No. 9. pp. 403–409. With 4 figs.

From a study of eighteen cases the author concludes : 1. Anaesthetic bacteriologically negative lesions in leprosy in Nigeria constantly show tuberculoid changes. 2. In three lepromatous cases transition from the tuberculoid tissue reaction was met with. *L. R.*

REENSTIERNA (J.). Du rôle possible de la lèpre dans l'étiologie des sarcoides de Besnier-Boeck et dans l'étiologie de la maladie de Schaumann. [**Leprosy in Relation to Besnier-Boeck's and Schaumann's Diseases.**]—*Acta Med. Scandinavica.* 1940. Vol. 103. No. 1–2. pp. 118–122.

The author concludes from a short discussion of this subject that the cutaneous lesions of leprosy may resemble histologically lupus pernio of Besnier, the cutaneous sarcoids of Boeck and erythroderma of Schaumann. It has not been demonstrated that the micro-organism of leprosy is able to produce the reactions of the reticulo-endothelial system that constitute Schaumann's disease. *L. R.*

CONCEPCION (Isabelo) & CAMARA (Solita F.), with the assistance of Buenaventura FULGENCIO. **Studies on Vitamin C: VI. The Blood Ascorbic Acid in Leprosy.**—*Jl. Philippine Islands Med. Assoc.* 1939. Dec. Vol. 19. No. 12. pp. 733–740. [14 refs.]

The author reports estimations of ascorbic acid in the blood of ninety-six leprous patients, and found it to be reduced especially in the plasma, much in proportion to the severity of the case. The intramuscular injection of 50 mgm. restored the normal level.

*L. R.*

MANALANG (J.). **A Comparison of the Cooper Modification and the Culion Modification of the Ziehl-Neelsen Staining Method for** *Myco. leprae.*—*Monthly Bull. Bureau of Health.* Manila. 1939. July. Vol. 91. No. 7. pp. 287–292.

The author has carefully compared the staining results obtained by the usual Ziehl-Neelsen staining with the modified Cooper method. This is based on the principle that some electrolytes precipitate the dye and increase its staining powers. For this purpose he adds 3 cc. of a 10 per cent. solution of sodium chloride to 97 cc. of carbol fuchsin. By the rapid method the stain is steamed on the slide for four minutes, and allowed to cool, until the precipitate forms in about two minutes, before washing, or the staining is carried out in an incubator all night, and precipitation obtained by placing the stain and slides in an ice box for half an hour. As about 28 per cent. more positives were obtained by the Cooper method it is advised in suspicious cases which are frequently negative by standard staining methods. *L. R.*

RODRIGUEZ (J. N.), WADE (H. W.) & PLANTILLA (Fidel C.). **Conversion of Simple Macular Neural Leprosy to the Lepromatous Type. A Report of Three Cases.**—*Internat. Jl. Leprosy.* Manila. 1939. Oct.–Dec. Vol. 7. No. 4. pp. 463–472. With 1 text fig. & 9 figs. on 2 plates.

This paper records in detail three cases of simple macular leprosy, out of 52 microscopically examined in the Philippines, in which lepromatous lesions later developed. In the first case the change of type occurred after several years' quiescence, and followed periods of fever and weakness; presumably a reaction condition. Retrogression followed treatment, but the ultimate outcome is uncertain. In the second case the macular lesion for a long time continued to be anaesthetic and bacteriologically negative, although an extensive erythema was suspicious. Later lepromatous lesions appeared and the outlook appears to be unfavourable. In the third case in 1933 one of three small lesions microscopically showed a slightly tuberculoid condition with a few lepra bacilli, but only moderate progression for one year. During the next six months many new lesions appeared without change of form, but on re-examination three years later all the lesions examined showed lepromatous lesions with abundant bacilli. It thus appears that in exceptional cases ordinary macules are not immune to lepromatous change, especially if only slight tuberculoid lesions are present. *L. R.*

WADE (H. W.), RODRIGUEZ (J. N.) & TOLENTINO (J. G.). **The Course of Open Cases of Tuberculoid Leprosy at the Cebu Leprosarium.**—*Internat. Jl. Leprosy.* Manila. 1939. Oct.–Dec. Vol. 7. No. 4. pp. 473–494. With 4 text figs. & 34 figs. on 10 plates.

This is a further detailed description of tuberculoid lesions illustrated by a number of good photographs of the naked eye appearances of the skin lesions. It is best summarized in the authors' own words :—

"The clinical features and histological findings in eight tuberculoid neural-type cases in the Philippines, that were hospitalized because bacteriologically positive and observed from two to more than six years, are recorded.

"In seven cases the principal lesions were of major grade, moderate or very marked ; but one case, though otherwise essentially similar, was never more than of minor grade.

"In three, if not four, other cases, after partial subsidence of the condition, some of the lesions progressed as of the minor tuberculoid variety, giving further evidence of lack of fundamental type differentiation of the ordinarily recognized (major) tuberculoid condition from the lesser forms of neuromacular leprosy.

"In two cases there was unilateral involvement of a nerve trunk of an extremity on which the first lesion appeared, further indicating that in this form of the disease such affection may occur by extension through the cutaneous nerves, and not necessarily by metastasis.

"Onset of the disease was commonplace, in three instances with anesthesia preceding the appearance of macules, which in the group as a whole were usually of the simple form at first. Development of the condition that led to hospitalization usually, though apparently not invariably, resulted from reaction, whether mild or severe. Several cases experienced one or more relapses by reaction after they came under observation.

"A striking feature of the condition, hitherto not emphasized, is a secondary eruption, primarily papular or mixed papular and macular, often abundant, that can be ascribed only to metastatic dissemination of the infecting agent by way of the blood stream.

"As a rule the lesions of the secondary eruption did not enlarge centrifugally. Only in the three cases in which there was no definite evidence of reaction did papular elements of the eruption progress to become macular. These phenomena are assumed to be related to a heightened resistance, of greater or lesser effectiveness, associated with reaction.

"Contrary to the general impression with regard to recovery of the reaction tuberculoid condition, and in spite of the generally rapid subsidence of lesions after the reaction in our patients, the frequent persistence of bacilli in the lesion areas and the frequency of relapse make the ultimate prognosis of such cases uncertain." *L. R.*

STEIN (A. A.). **Tuberculoid Changes in Leprosy.**—*Internat. Jl. Leprosy.* Manila. 1940. Jan.–Mar. Vol. 8. No. 1. pp. 41–52. With 12 figs. on 3 plates. [21 refs.]

From a study of six cases the author concludes that macules, infiltrations and nodules of nerves may present tuberculoid changes histologically, in which respect they are like such conditions as lichen scrofulosus, lupus, Boeck's sarcoid and even tuberculosis of the internal organs. The existence of transition forms between one kind of lesion and another, both clinically and histologically, is against the existence of a special tuberculoid form of leprosy. Tuberculoid changes are the expression of a peculiar allergic condition, accompanied by strongly developed immunity and benignity of the case. Their diagnosis is difficult. *L. R.*

DENECKE (Karl). Ergebnisse bei der Untersuchung Leprakranker. [**Research on Leprosy.**]—*Arch. f. Hyg. u. Bakt.* 1940. Vol. 124. No. 1. pp. 33–45.

The author reports his observations on 49 leprosy cases in Negroes of Spanish West Africa. They include a clinical analysis, blood counts, the formol-gel and Rubino reactions and the histamine test, but they reveal nothing novel. *L. R.*

ROSS (Hilary). **Basal Metabolism in Leprosy.**—*Internat. Jl. Leprosy.* Manila. 1940. Jan.–Mar. Vol. 8. No. 1. pp. 53–59.

CHEW (B.). **Trigeminal Pain due to Leprosy.**—*Brit. Med. Jl.* 1940. Feb. 3. p. 172. With 1 fig.

DHARMENDRA & CHATTERJI (S. N.). **Leprosy and Dermal Leishmaniasis.**—*Leprosy in India.* 1940. Jan. Vol. 12. No. 1. pp. 4–10. With 9 figs. on 4 plates.

The authors report three patients sent for the treatment of leprosy in whom only dermal leishmaniasis was found, and one of the opposite mistake. Good photographs are included. *L. R.*

FERNANDEZ (José M. M.). **The Early Reaction induced by Lepromin.**—*Internat. Jl. Leprosy.* Manila. 1940. Jan.–Mar. Vol. 8. No. 1. pp. 1–14. With 16 figs. on 3 plates. [11 refs.]

The author brings evidence to show that the value of the lepromin test is not only in the definitive reading between the third and the fourth week after the inoculation, but that the early reaction from a few hours after injection to its maximum between 48 and 72 hours is also of significance, and is allergic in nature. Clinically it appears as a usually infiltrated erythematous halo, and is only seen in the resistant neural and tuberculoid forms, and not in lepromatous cases. In 95 per cent. of cases the early reaction coincides with the late third week nodular reaction. The two reactions are probably produced by different toxins of Hansen's bacillus, for a filtrate of lepromin always gives the early reaction in allergic cases, but only exceptionally a faint late reaction. Very similar reactions with tuberculin indicate that Hansen's bacillus contains soluble toxins separable from the bacilli, and insoluble ones that cannot be dissociated. The early lepromin reaction resembles clinically and histologically the Mantoux reaction, but in a group of lepers and contacts the reactions with both did not agree in 45 per cent. of the cases. The naked eye and histological changes in the reactions are illustrated. *L. R.*

LARA (C. B.). **Mitsuda's Skin Reaction (Lepromin Test) in Children of Leprous Parents. II. Observations on Newly-born to Eighteen-Month-Old Children.**—*Internat. Jl. Leprosy.* Manila. 1940. Jan.–Mar. Vol. 8. No. 1. pp. 15–28.

The tests on 110 young children, from the newly born up to eighteen months, reported on in this paper were carried out with a view to correlating the results of the lepromin test with the onset and later development of leprosy in children over a period of twenty months. Earlier statements that the lepromin test is constantly negative in

children under one year of age were not borne out; for a few gave definite reactions, and they could be induced in most of the children by repeating the test every four months. The frequency of positive reactions however increased with age, but the proportion of reactors was probably in part the result of retestings, for the majority of children under one year reacted on the second or third test. The appearance or existence of early leprotic lesions in the children was associated with an apparently undiminished, and possibly even greater, tendency to react positively. Both the duration and constancy of exposure to leprous environment seemed to bear a direct relation to the proportion of positive reactions. Intercurrent disease not of a serious nature showed no depressing influence on the reaction. *L. R.*

MOISER (B.). **The Potassium Iodide Test in Leprosy.**—*Leprosy Review.* 1940. Apr. Vol. 11. No. 2. pp. 99–101.

With the encouragement of the originator of the method, E. MUIR, the author tested the reactions of arrested cases, before their discharge, to large doses of potassium iodide, and contrary to an earlier experience, he met with no dangerously severe reactions in forty cases. They have now all been discharged apparently cured. During ten years' experience in the favourable climate of Southern Rhodesia, 53·9 per cent. of his admissions have been discharged and have not returned.

*L. R.*

PUPO (J. Aguiar). Das formas clínicas da lepra. Modalidades invasoras e reacionarias. [**Clinical Forms of Leprosy.**]—*Rev. Brasileira Leprologia.* S. Paulo. 1939. Dec. Vol. 7. No. 4. pp. 357–390. With 1 folding chart & 18 figs. on 9 plates. English summary.

This paper discusses the classification of leprosy cases. After referring to those of earlier authorities, the author states that South American experience is in accordance with Jeanselme's three anatomico-clinical types rather than with those of the Cairo Conference. The paper includes good illustrations of the clinical and histological appearances.

*L. R.*

MOISER (B.). **Results of Treatment at the Ngomohuru Leprosy Hospital over a Period of Ten Years, 1929–1938.**—*Internat. Jl. Leprosy.* Manila. 1940. Jan–Mar. Vol. 8. No. 1. pp. 69–70.

This brief note tabulates the results obtained in the treatment of leprosy with various chaulmoogra preparations over a period of ten years. They confirm the author's impressions that Moogrol gave the best results with 26·5 per cent. of the patients discharged. Alepol, which is more painful and Glycalepol gave 26·8 per cent. of discharges among 365 cases, and Alepol, Antileprol and iodized esters 18·8 per cent. Iodized esters showed 12·3 per cent. of discharges. The average residence of patients before discharge as "arrested" was 20·3 months.

*L. R.*

LABERNADIE (V.). Essais de traitement de la lèpre par l'huile neutralisée de Krabao (*Hydnocarpus anthelminthica*). [**Trials of Neutralized Krabao Oil.**]—*Rev. Méd. Française d'Extrême-Orient.* 1939. Aug.-Sept. No. 7. pp. 823–826.

This note records the results of treatment with the Indo-China krabao oil (*Hydnocarpus anthelmintica*) in 1 to 3 cc. doses intravenously. The author points out that the cases are too few to judge from, but his impression was that the oil was less efficacious than that of *H. wightiana.* *L. R.*

MONTEL (M. L. R.). Dispositif pour le traitement de la lèpre par le bleu de méthylène-chaulmoogra et l'oxygène ozonisé. Bases de la méthode. [**Methylene Blue Chaulmoogra-Ozonized Oxygen Treatment.**]—*Rev. Méd. Française d'Extrême-Orient.* 1939. Aug.–Sept. No. 7. pp. 827–832.

The author was led by the recommendation, by O. de ALMEIDA and H. de MOURA COSTA [see this *Bulletin*, 1938, Vol. 35, p. 889], of methylene blue combined with oxygen under pressure, to try in the place of the latter ozonized oxygen by the rectum every other day in quantities of 800 cc. This was combined with doses of 25 to 40 cc. of 1 per cent. chemically pure methylene blue on alternate days. The ozonized oxygen can also be injected under leprous lesions. Only the method is now recorded as the author's experience is too short to allow of any conclusions being arrived at regarding the value of this plan.

*L. R.*

ZANETTI (V.). Les sels d'or dans le traitement de la lèpre: le Néo-Solganal. [**Gold Treatment with Neo-Solganal.**]—*Ann. Soc. Belge de Méd. Trop.* 1940. Mar. 31. Vol. 20. No. 1. pp. 139–148.

In view of former trials of Solganal B the author has used gold and calcium, or Neo-solganal, in 12 cases of leprosy. He obtained improvement in their general health, and decrease in the rapidity of the sedimentation time of the red corpuscles, in doses up to 0·20 gm. in a strength of 14 per cent. solution, and total amounts of 1·76 to 4·25 gm. in the course of six months' treatment. Gain in weight and a marked increase in the percentage of eosinophile leucocytes in the blood were also noted, but little effect on the skin lesions. *L. R.*

DE GOLOVINE (S.). Zur Goldbehandlung der Lepra. [**Gold Treatment.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1940. Jan. Vol. 44. No. 1. pp. 39–42.

The author reports seven Negro leprosy patients who were treated with Auro-detoxin. Intramuscular and intravenous injections were given twice a week, commencing with 0·05 gm. and increasing to 0·5 gm. up to a total amount of 5 gm. The drug was well tolerated in all stages of the disease, and the immediate effects were rapid and favourable. As soon as the patients showed considerable improvement they vanished into the bush and could not again be found, so the later results are unknown. *L. R.*

HOU (H. C.). **Vitamin $B_1$ in the Treatment of Leprosy. 1. Vitamin $B_1$ Excretion in Urine.**—*Internat. Jl. Leprosy.* Manila. 1939. Oct.–Dec. Vol. 7. No. 4. pp. 455–462. With 2 figs.

This paper records data of the excretion of vitamin $B_1$ in the urine in untreated cases of leprosy and after the administration of the preparation orally and by subcutaneous injection. Before treatment the excretion of vitamin $B_1$ was either nil or in very small amounts far below the normal level. After both oral and subcutaneous injection large amounts were excreted in the urine, and the oral use in sufficiently large doses sufficed to produce saturation to the same degree as when given parenterally. The excretion was not influenced by such factors as fever, the injection of chaulmoogra preparations or iodides, or by the type of the disease. It is therefore advisable to administer vitamin $B_1$ to leprosy patients especially when neuritis is present.

*L. R.*

DELANOË (E.), Mme. Travail d'ensemble sur le traitement mixte de la lèpre. [**Mixed Treatment.**]—*Bull. Soc. Path. Exot.* 1939. Dec. 13. Vol. 32. No. 10. pp. 937–944. [10 refs.]

VIEIRA (João Paulo). Physiotherapie na lepra. [**Physiotherapy in Leprosy.**]—*Brasil-Medico.* 1939. Sept. 16. Vol. 53. No. 38. pp. 900–902.

GERMOND (R. C.). **Treatment of Lepra Reaction and Lepromatous Ulcers by Antimony and the Arsphenamides.**—*Internat. Jl. Leprosy.* Manila. 1940. Vol. 8. No. 1. pp. 29–39. With 6 figs.

Owing to the depressant action of the commonly used potassium antimony tartrate in lepra reactions, the author has used Fouadin with success in ending the rise of temperature, as illustrated by a number of charts. The most acute type of case responded best with accompanying clinical improvement. The drug has the further advantage that it can be given by the intramuscular route in doses of 2 to 5 cc. Prontosil had a similar and even more pronounced effect. Soluseptasine was used in 5 to 10 cc. doses, either intra-arterially or intramuscularly with good effect in causing rapid cleansing of septic leprotic ulcers. Neither Fouadin nor the arsphenamides had any effect on leprosy itself. *L. R.*

COCHRANE (R. G.). **General Principles in the Treatment of Trophic Ulcers in Leprosy.**—*Leprosy in India.* 1940. Jan. Vol. 12. No. 1. pp. 11–16. With 11 figs. on 6 plates.

The author records his experience of treating trophic ulcers at the large Lady Willingdon Leper Settlement near Madras. For cleansing the ulcers he advises eusol solution on dressings changed two or three times a day, or else iodoform grains 10 and eucalyptus oil 1 oz., as used at Chandkuri. For sinuses warm saline or hypertonic saline, and for oedema saturated magnesium sulphate baths. For cellulitis multiple small incisions are advised, and syringing with Ryrie's dettol solution 1 in 20. After sepsis has been controlled any dead bone should be removed. Hydnocarpus or cod liver oil may be injected around the ulcers. Splints and strapping are useful for affording rest. After

operation 5 per cent. sulphanilamide paste dressings, changed once a week, have been used with advantage. Amputation is only required to save life or for a resistant painful and deformed limb. *L. R.*

RYRIE (G. A.). **Vitamin A Treatment of Ulcers.**—*Internat. Jl. Leprosy.* Manila. 1939. Oct.–Dec. Vol. 7. No. 4. pp. 549–550.

This brief note refers to the indications from recent literature that almost a specific effect in healing leprous ulcers is produced by any dressings containing vitamin A, such as cod liver oil, red palm oil, minced goat's liver, etc. The author has used for this purpose shark liver oil with a vitamin content of 22,000 international units per gm. This can be prepared by wrapping the liver in muslin and boiling it in water, when the oil comes to the surface. He advises the following as an agreeable preparation locally: red palm oil 4 parts, cod liver oil 4 parts, eucalyptus oil 1 part, zinc oxide 1 part and Hydnocarpus oil 2 parts. For syringing a sinus the eucalyptus oil and zinc oxide may be omitted. *L. R.*

DAS (Nityanand). **Treatment of Perforating Ulcers with Rivanol.**—*Leprosy in India.* 1940. Jan. Vol. 12. No. 1. pp. 17–18.

Only disappointing results were obtained with this method.

*L. R.*

DELINOTTE (H.). **The Fight against Leprosy in the French Overseas Territories. Rôle of the Commission Consultative de la Lèpre of the Ministry of Colonies in the Organization of Antileprosy Prophylaxis.** —*Internat. Jl. Leprosy.* Manila. 1939. Oct.–Dec. Vol. 7. No. 4. pp. 517–547.

This lengthy paper gives the history of measures against leprosy in the French colonies, followed by data of the prevalence of the disease therein.

As early as 1902 notification of leprosy cases was made obligatory in all French Colonies. In 1914 the Academy of Medicine considered the question at the request of the Minister of the Interior, and they advised "rigorous measures designed to stop the spread of leprosy in the colonies and countries under protectorate," but the administrations lacked accommodation for patients under the system of obligatory confinement which was then considered necessary, so no active campaign was undertaken. In 1931 a consultative commission on leprosy in the colonies was established to elaborate a plan for an anti-leprosy campaign on modern lines under the direction of leprosy experts, with the late Professor Jeanselme as honorary president and Professor Marchoux as president. In 1932 they drew up a programme, after first studying the local conditions, for submission to the ministry. Eight years previously, in 1924, a ministerial circular had recommended improvements in the treatment and care of the lepers, and a new one was now sent to the colonial governors constituting a "charter of prophylaxis" to be put into practice at once. This sought to inspire "on the humanitarian principle which is necessary, while safeguarding the healthy population, the abandonment of the mediaeval principle of compulsory segregation and the establishment of more humane regulations than those which are generally in force."

The principal measures to be relied on are the enumeration of lepers, the isolation in institutes and colonies of advanced and crippled cases unable to care for themselves, and of open contagious cases, including carefully safeguarded home isolation, and the treatment of closed uninfective cases which will be isolated at home. Propaganda and full records of the measures and their results are also to be provided for. Directions for treatment are laid down in which various chaulmoogra preparations take the first place and are supplemented by the use of methylene blue.

Detailed statistics of the known cases in the various French colonies follow, a summary of which shows 104,000 known and 170,000 estimated cases. *L. R.*

MONTESTRUC (E.). Considérations sur l'immigration des lépreux en France. [**Immigration of Lepers into France.**]—*Bull. Soc. Path. Exot.* 1940. Feb. 14. Vol. 33. No. 2. pp. 73–76.

This note considers the factors that lead leprosy patients to immigrate to France from such colonies as Martinique. They are chiefly attracted by the prospects of better treatment in a country where the nature of the affection is not so likely to be recognized. Their return should be discouraged. *L. R.*

BELGIQUE: Ministère des Colonies. Rapport de la Commission de la Lèpre. 1939. [**Commission on Leprosy.**] [Also in Flemish.]—31 pp. 1939. Bruxelles: Ministère des Colonies.

BRUXELLES: Fondation Père Damien pour la lutte contre la lèpre, établissement d'utilité publique, à Bruxelles. Statuts. [Also in Flemish.]—7 pp. 1939. Bruxelles: Imprimerie du Moniteur Belge.

This deals with the disease in the Belgian Congo, where 60,363 cases have been found and 14,983 are isolated in leprosaria, nearly all of the agricultural colony type, but 3,000 were in segregation villages or camps. Treatment is provided and cultivation of the trees that furnish chaulmoogra and hydnocarpus oils is recommended, together with the extension of isolation in colonies. *L. R.*

BARRETO (João Barros). **Leprosy Control in Brazil.**—*Internat. Jl Leprosy.* Manila. 1940. Jan.–Mar. Vol. 8. No. 1. pp. 61–68. With 4 figs. on 2 plates.

The progress in the campaign against leprosy, since in 1935 it was given a national character, is briefly described. A census and estimates, which are still incomplete, give the known leprosy cases as 35,241. Emphasis is laid on isolating the lepromatous and mixed forms, from which 95 per cent. of new infections arise. The leprosy institutions functioning or planned will enable 24,888 patients to be accommodated. They are to have sufficient land in healthy areas for agricultural purposes. Federal appropriations for construction or improvement of the institutions amounted in 1939–40 to $11,800,000. Dispensaries in existence also number 41. Work is being done on the chemistry of chaulmoogra and allied oils, and the results of treatment are encouraging. *L. R.*

## RELAPSING FEVER.

### *Précis* of Abstracts in this Section.

Ordman and Jones (p. 638) report that in an epidemic of relapsing fever in S. Africa epistaxis with high fever was pathognomonic. They describe the clinical features and state that the mortality was 9 per cent. A single dose of 0·45 gm. novarsenobillon at the height of the fever was usually successful in preventing relapse and the authors give information on the additional forms of treatment used.

Bertram (p. 639) has studied the mouthparts and the feeding mechanism of *Ornithodorus*. Davis (p. 639) reports the finding of infection in *Ornithodorus hermsi* in Colorado, where relapsing fever is endemic but where the vector has not hitherto been known. Philip and Davis (p. 640) give data which suggest that *O. hermsi* was the vector of relapsing fever in a cabin on Moscow mountain, Idaho. Davis and Walker (p. 640) give an account of their observations on the feeding and moulting habits of *O. hermsi* in relation to the acquisition and transmission of the spirochaetes of relapsing fever.

In the Belgian Congo Boné (p. 641) was not able to prove transmission by *Argas reflexus* or *R. sanguineus* although infection persisted in them for several months. *C. W.*

Ordman (David) & Jones (F. R.). **Some Clinical Aspects of Tick Relapsing Fever in Natives in South Africa.**—*South African Med. Jl.* 1940. Feb. 24. Vol. 14. No. 4. pp. 81–83.

Notes on the clinical aspects of an outbreak of tick relapsing fever among natives in the north-western part of Cape Province during 1936 to 1938. [See this *Bulletin*, 1940, Vol. 37, p. 198.]

The incubation period is uncertain, but the interval elapsing between the first possible contact with ticks and admission to hospital ranged from 11 to 21 days. The principal symptoms noted were severe headache and pains in the limbs and occasionally the disease began with a rigor, although rigors were generally uncommon. Abdominal symptoms were not observed on first admission, but in relapses pain on the left side of the abdomen was frequently complained of.

On admission the temperature usually ranged from 102° to 105°F. and congestion of the conjunctivae was almost always seen. Every case with epistaxis and high fever was later shown to be relapsing fever, and epistaxis was pathognomonic of this epidemic. After about 12 hours of fever the temperature fell rapidly within 12 to 18 hours to 96–97°F., accompanied by signs of shock and profuse sweating. Sometimes the fever lasted 3 to 4 days, but these cases may have been relapses.

After an interval of 4 to 7 days or longer from the first attack, in untreated cases there was a relapse which often lasted 3 to 4 days, but occasionally only one day. In relapses there was nearly always a somewhat enlarged and tender spleen and sometimes jaundice was present. When a number of relapses occurred, in nearly all cases the liver was found to be slightly enlarged.

In untreated cases there was a tendency for various toxic degenerative processes to occur, and haemorrhages were important complications. Nervous manifestations, including loss of sphincter control, were found in prolonged cases. A very common sequel was

"rheumatic" pains which persisted after the acute disease had apparently been cured.

The mortality rate was about 9 per cent. in untreated cases and a fatal outcome was associated as a rule with debility, heart failure, pneumonia and acute intestinal infections. In chronic cases treatment after several relapses was not so satisfactory as in those diagnosed promptly and treated early.

The cases were usually treated with a single dose of 0·45 gm. Novarsenobillon given intravenously at the height of the fever, and this was usually successful. In the small number that relapsed a second dose at the height of the fever prevented further relapses.

The use of Spirit. ammon. aromat. 20 minims every two hours was found beneficial in combating shock in the initial pyrexia until the danger of collapse had passed. To relieve body pain sodium salicylate grains 10 (alone or with Spirit. ammon. aromat. 10 minims) may be given, when the danger of collapse is not imminent. In secondary attacks intravenous glucose solution was found of value in debilitated cases and in cases with respiratory complications. *E. Hindle.*

BERTRAM (D. S.). **The Structure of the Capitulum in** *Ornithodoros*: **a Contribution to the Study of the Feeding Mechanism in Ticks.**—*Ann. Trop. Med. & Parasit.* 1939. Dec. 30. Vol. 33. Nos. 3 & 4. pp. 229–253. With 22 figs. [28 refs.]

Parasitologists will welcome this full and well illustrated account of the mouthparts and related structures of *Ornithodorus*, a tick of great interest and importance. The paper shows that, in most respects, *Ornithodorus* is very similar to *Argas*, of which the anatomy was described many years ago by ROBINSON and DAVIDSON.

One part of the paper contains valuable new material and interpretation, for the author has increased our knowledge of the relations and functions of the region at the base of the mouthparts. He attaches great importance to the tongue-like process, which is thin walled and capable of expansion. Above it lies the opening of the salivary duct, below it the orifice of the pharynx. It seems that when the mammal's blood has passed into the tick's pharynx, the tongue-like process acts as a valve and prevents regurgitation of blood when the pharyngeal muscles contract and drive the blood onward towards the midgut. The author also puts forward a reasonable theory to account for the entry of the saliva into the wound, a point which has always been obscure, for the saliva is poured out among the bases of the mouthparts.

The view put forward by SEN (1934, 1935), that there is a median stylet perforated by a minute duct, is gone into with care. Bertram is not able to support that interpretation. *P. A. Buxton.*

DAVIS (Gordon E.). **Relapsing Fever:** *Ornithodoros hermsi* **a Vector in Colorado.**—*Public Health Rep.* 1939. Dec. 8. Vol. 54. No. 49. pp. 2178–2180.

A record of the discovery of *Ornithodorus hermsi*, infected with spirochaetes, in eastern Colorado.

Although the earliest known endemic focus of relapsing fever in the United States is in Colorado, hitherto the method of transmission has remained uncertain. In September 1938, an extensive search was made in Park County, a neighbourhood about 40 miles south-west of

Denver at a height of 8,000 ft., where two cases of relapsing fever had occurred, and 51 specimens of *Ornithodorus hermsi* had been found in a chipmunk's (*Eutamias* sp.) nest. These were uninfected, but in June 1939, a further lot of 213 of these ticks were found in the same locality and infection was produced in white rats on which they were fed. The progeny from these ticks also proved infective.

In addition a single nymph of *O. parkeri* was collected from a group of 8 prairie dogs (*Cynomys* sp.) caught in Moffat County, north-western Colorado, but no cases of relapsing fever have been recorded from that district.

Hitherto, *O. hermsi* has only been known from San Bernardino and San Benito Counties, California, and near Moscow, Idaho, so the present observation extends its range eastward nearly 600 miles and suggests the possibility of its sporadic occurrence in other parts of the Rocky Mountain region. *E. H.*

PHILIP (Cornelius B.) & DAVIS (Gordon E.). **Relapsing Fever: Data implicating *Ornithodorus hermsi* as a Vector in Northern Idaho.**—*Public Health Rep.* 1940. Mar. 22. Vol. 55. No. 12. pp. 504–507.

The description of cases of relapsing fever occurring in a cabin on Moscow Mountain, Idaho, associated with the presence of *Ornithodorus hermsi*.

The only mammals seen or captured in this building were occasional mice (*Microtus*), yet a live bait of white rats and a guineapig in cages over wood shavings and paper on the bedroom floor resulted in the capture of 4 adult ticks, 2 nymphs and 2 larvae, all *O. hermsi*.

Various persons who had stayed in the cabin were bitten by ticks and at least 6 cases of relapsing fever seem to have occurred among them. Two of these were diagnosed by the discovery of spirochaetes in the patients' blood. Rats were successfully infected by inoculation from one of these patients and after passage through another rat the spirochaete was transmitted by means of *Ornithodorus hermsi*.

The examination of 5 rats, 1 field mouse, 2 chipmunks and 2 pine squirrels taken near the cabin was negative. *E. H.*

DAVIS (Gordon E.) & WALKER (Mary E.). *Ornithodorus hermsi*: **Feeding and Molting Habits in Relation to the Acquisition and Transmission of Relapsing Fever Spirochetes.**—*Public Health Rep.* 1940. Mar. 22. Vol. 55. No. 12. pp. 492–504.

An account of feeding experiments with *Ornithodorus hermsi*, showing that during the winter months this tick may feed several times without moulting and at the same time may acquire and transmit spirochaetal infection.

All the ticks were kept at room temperature. During the period October to January, 75 out of 85 engorged more than once in one of the nymphal stages. Out of 58 ticks given one or more infective meals during the larval or first and second nymphal stages, 38 later transmitted spirochaetes. Nineteen of these transmitted during the multiple feeding period.

Out of 26 ticks that received their infective blood meal during the multiple feeding period, 6 subsequently transmitted spirochaetes.

The paper is accompanied by tables giving full details of the various feedings. *E. H.*

BONÉ (Georges). Contribution à l'étude de la transmission de la fièvre récurrente tropicale. (Deuxième mémoire.). [**A Contribution to the Study of the Transmission of Tropical Relapsing Fever. (Second Memoir).**]—*Ann. Soc. Belge de Méd. Trop.* 1939. Dec. 31. Vol. 19. No. 4. pp. 477–484. [12 refs.]

A record of the results of attempts to transmit *Spirochaeta duttoni* by various ectoparasites other than *Ornithodorus*. *Argas reflexus* fed on infected mice and kept at 30°C. were found to contain virulent spirochaetes for at least seven months, but all attempts to produce infection either by their bites or by the inoculation of coxal fluid were negative. The injection into mice of 25 larvae that hatched from eggs laid by such *Argas* also gave negative results.

*Rhipicephalus sanguineus* infected in the larval stage were negative in the nymphal stage, but if these ticks were fed on infected mice in the nymphal stage the adults that emerged still contained virulent spirochaetes 3 months later.

In *Cimex lectularius* and *Melophagus ovinus* the spirochaetes were found to survive not more than 48 hours and neither was able to transmit the infection by bite. [See also this *Bulletin*, 1940, Vol. 37, p. 203.] *E. H.*

BONÉ (Georges). Contribution à l'étude de la transmission de la fièvre récurrente tropicale. [**A Contribution to the Study of the Transmission of Tropical Relapsing Fever.**]—*Arch. Internat. Méd. Expérim.* 1939. Dec. Vol. 14. No. 3. pp. 137–173. [44 refs.]

See this *Bulletin*, 1940, Vol. 37, p. 203.

THAYER (Kent H.). **Relapsing Fever.**—*Southwestern Med.* 1940. Apr. Vol. 24. No. 4. pp. 125–127. [14 refs.]

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## RAT-BITE FEVER.

### *PRÉCIS* OF ABSTRACTS IN THIS SECTION.

MORALES VILLAZON (p. 641) found *Spirillum minus* in 25·5 per cent. of rats examined in Buenos Aires, although only 2 human cases have hitherto been reported in S. America. DUBOIS (p. 642) shows that chicks hatched from eggs artificially inoculated with infected blood may themselves show *S. minus* in the blood. MANOUÉLIAN (p. 642) describes infection of the tongue of rodents by *S. minus* and notes that in rats and mice sodoku develops without producing obvious symptoms except splenomegaly. *C. W.*

MORALES VILLAZON (Nestor). Hallazgo del *Spirillum minus* en las ratas del Puerto de Buenos Aires. [**Finding of *Spirillum minus* in Rats of the Port of Buenos Aires.**]—*Rev. Inst. Bacteriológ.* Buenos Aires. 1939. Dec. Vol. 9. No. 2. pp. 156–166. With 2 figs.

Search in the literature has revealed to the author only two human cases of rat-bite fever in South America, one reported from Montevideo

in 1930 and one in the Hospital Muñiz, Buenos Aires, in 1934. He has tested a number of wild rats and inoculation of their brain tissue into 167 laboratory animals (Chanchitos) has given 34 positive results (20·3 per cent.). [The number of rats examined is not clear unless we are to infer that one experimental animal only was inoculated from each rat.] The author concludes that Buenos Aires rats show a high index of infection. Cultivation of the spirillum was attempted repeatedly but without success. *H. H. S.*

DUBOIS (A.). Inoculation du sodoku à la poule et à l'embryon de poule. [**The Inoculation of Sodoku into the Fowl and the Fowl Embryo.**]—*C. R. Soc. Biol.* 1940. Vol. 133. No. 1. pp. 100–102.

Eggs of fowls after 10 days' incubation were inoculated with the blood of mice infected with sodoku, and examined, usually 8 to 10 days later, by dark ground illumination, and also by the inoculation of the contents of the eggs into normal mice.

About 40 eggs were treated in this way and although the results of microscopical examination, with one exception, were uniformly negative, 6 out of 8 inoculations were positive. In three cases the chicks that hatched from such eggs contained the infection in their blood as demonstrated by inoculations into mice. These chicks died soon after hatching.

In the adult fowl the inoculation of sodoku, as shown by SCHOCKAERT, produces no obvious or latent infection and the serum of such birds does not develop any new agglutination or similar properties.

*E. Hindle.*

MANOUÉLIAN (Y.). Le sodoku chez quelques muridés. [**Sodoku in Various Rodents.**]—*C. R. Soc. Biol.* 1940. Vol. 133. No. 4. pp. 582–585. With 1 fig.

The author previously noted* that in rats and mice the spirillum of rat-bite fever is attracted to the muscle fibres of the tongue and he now gives some further details. In silver preparations the organisms may be seen under the sarcolemma, but they do not penetrate into the thickness of the muscle fibre.

The spirilla escape from the muscle fibres to the surface of the tongue, owing to the fact that in certain regions, especially the tip of the tongue, the muscles are covered only by a very thin epithelial layer which is easily broken.

In rats and mice sodoku develops without producing any obvious clinical symptoms, but the author finds that most of the animals show distinct splenomegaly. *E. H.*

LEWTHWAITE (R.). **Agglutination of Proteus in Rat-Bite Fever.** [Correspondence.]—*Lancet.* 1940. Feb. 24. p. 390.

A brief statement that Dr. SAVOOR at the Institute for Medical Research, Kuala Lumpur, F.M.S., found that the serum of rabbits inoculated with infected material from a case of rat-bite fever agglutinated the *OXK* strain of *Proteus*. This finding was obtained once before at the Institute. *E. H.*

* *C. R. Soc. Biol.*, 1939, Vol. 131, p. 1012.

# LEPTOSPIROSIS.

## *Précis* of Abstracts in this Section.

Brown (p. 643) describes a rapid macroscopic agglutination test for leptospirosis which is read by means of a hand lens. Although not so sensitive as the Schüffner method it is reliable enough to justify the administration of curative serum if positive, and it can be read in 15 minutes. The tests carried out by Kolochine-Erber and Stefanopoulo (p. 643) on human sera in French Equatorial Africa indicate that leptospirosis is much more common than was previously suspected. The importance of using different strains of leptospira in the tests is emphasized.

Rizzotti (p. 644) reports leptospirosis in S. Abyssinia, especially in the highlands. Mochtar and Collier (p. 644) found considerable evidence of leptospirosis in dogs in Batavia. In reporting leptospirosis in French Guiana Floch *et al.* (p. 645) point out that severe cases may be mistaken for yellow fever, and that the high blood urea in leptospirosis is an important diagnostic point. *C. W.*

Brown (H. C.). **A Rapid Presumptive Serological Test for Weil's Disease.**—*Brit. Med. Jl.* 1939. Dec. 16. pp. 1183–1184. With 1 fig.

The author recommends a macroscopic technique for the rapid testing of serum for the presence of antibodies against *Leptospira icterohaemorrhagiae.*

The antigen for the test is prepared from heavy cultures of the leptospira in Fletcher's broth, formolized to a concentration of 0·2 per cent. Saponin is then added up to a concentration of 1 in 1,000, to facilitate sedimentation, and the mixture centrifuged at high speed. The deposit of leptospira is collected and suspended in saline until its opacity approximates that of a No. 1 Wellcome opacity tube used for the standardization of vaccines. This antigen is then centrifuged at 3,000 revolutions per minute for 10 minutes to remove any clumps of leptospira and the supernatant fluid is bottled for future use.

The test consists of mixing small quantities of varying dilutions of the patient's serum with equal quantities of the formolized suspension. The mixtures are rocked to and fro for 10 minutes either on a slide or in the depressions of a painter's palette, and the result read by means of a hand lens against a dark background, when any agglutination of the leptospirae is readily observed.

This method has been compared with Schüffner's agglutination technique but in every instance the latter gives a titre at least three times higher. With a suitable antigen the rocking-slide method produces a result within 15 minutes of the receipt of the serum, and is reliable enough to justify the administration of curative serum.

*E. Hindle.*

Kolochine-Erber (B.) & Stefanopoulo (G. J.). A propos d'une enquête sur les leptospiroses en Afrique Equatoriale Française. [**An Inquiry into the Leptospiroses of French Equatorial Africa.**]—*Bull. Soc. Path. Exot.* 1939. Dec. 13. Vol. 32. No. 10. pp. 919–923.

A record of the results of agglutination tests on 124 specimens of blood collected by Dr. Stefanopoulo in French Equatorial Africa.

The sera had been kept *in vitro* for long periods, during which some of the sera may have lost their agglutinins, as these deteriorate with age.

Ten sera from cases of jaundice at Pointe Noire, French Congo, were tested against the Verdun strain of *L. icterohaemorrhagiae* and all gave negative results.

Ninety-three sera from Brazzaville gave 16 feebly positive reactions against the same strain. Nine of these positive sera were tested against 8 other strains of *Leptospira*, including 4 European strains of *L. icterohaemorrhagiae*, 2 Netherlands, Rachmat and Salinem, and 2 water strains. The 4 European strains were all agglutinated more or less to the same titre, but negative results were obtained with the other four strains.

Twenty-one other sera were tested against 17 strains, including in addition to 7 of those mentioned above, 3 Japanese strains (*autumnalis* A & B, and *hebdomadis*), 6 strains of *L. canicola*, and another water strain. The results are as follows :—Tchilounga, French Congo, 7 sera ; 3 agglutinated the typical 3 strains of *L. icterohaemorrhagiae*. Mouila, Gabon, 6 sera ; 1 agglutinated the two Japanese strains *L. autumnalis* A & B, and another these two and also the Rachmat strain. Port Gentil, Gabon, 4 sera ; 3 agglutinated the Rachmat strain. Coco-Beach, Gabon, 4 sera ; 3 agglutinated the typical European strains.

These results suggest that leptospiroses are much more common in Equatorial Africa than previously suspected, and also show the necessity of making sero-diagnostic tests with different strains of *Leptospira*.

*E. H.*

RIZZOTTI (Giovanni). Notizie circa la presenza e la diffusione della malattia di Weil nelle regioni di Gardulla e Baco. [**Leptospirosis in Gardulla and Baco.**]—*Riv. di Biol. Colon.* Rome. 1939. Aug. Vol. 2. No. 4. pp. 241–253. With 2 figs. (1 map). English summary (8 lines).

" Notes are given of 71 cases of Weil's disease, which were under the author's observation in the period from June 1937 up to September 1938, in the regions of Baco and Gardulla (Southern Ethiopia).

" The fact that the incidence of the disease in the two regions mentioned above, appears greater below 1,500 metres and decreases above that altitude is pointed out as being in relation with the different hydrological factors existing in the two regions.

" The author communicates the native belief that the disease is spread by bats."

MOCHTAR (A.) & COLLIER (W. A.). Het leptospira-onderzoek bij honden te Batavia. [**Leptospira in Dogs in Batavia.**]—*Nederl. Indische Bladen v. Diergeneesk.* 1939. Dec. Vol. 51. No. 6. pp. 339–346. [20 refs.] English summary (9 lines).

" 1. 37·5 per cent. of the sera from 152 dogs in Batavia gave a positive agglutination and lysis reaction with strains of Leptospira from different serological types.

" 2. 22·4 per cent. of the sera were positive with the *L. bataviae*.

" 3. By the investigation of 152 dogs, it was found that five animals harboured leptospira in their kidneys.

" 4. It was serologically determined, that four strains belonged to the group of *Leptospira bataviae* and one to the *L. pomona*.

" 5. Neither *L. canicola* nor the original type of Wijnberg were isolated."

FLOCH (H.), GOERGER (F.) & TASQUE (P.). La spirochétose ictéro-hémorragique en Guyane Française. [**Ictero-haemorrhagic Spirochaetosis in French Guiana.**]—*Bull. Soc. Path. Exot.* 1940. Jan. 10. Vol. 33. No. 1. pp. 42–49. With 1 fig.

A description of two cases of Weil's disease, one fatal, the first to be recorded in French Guiana. They were identified by bacteriological and serological tests, and also by autopsy of the fatal case. There was evidence in support of the view that rats were responsible for both the infections.

Severe cases of this disease are often mistaken for yellow fever, and in the absence of bacteriological findings attention is drawn to the importance of the changes in the urine, slight albuminuria and "considerable uraemia" [which the author refers to under urinary changes] being in favour of Weil's disease. The estimation of blood urea is therefore of primary importance in cases of yellow fever.

*E. H.*

MOCHTAR (A.) & COLLIER (W. A.). De *Leptospira javanica* als een zelfstandige leptospira soort. [**Is** *L. javanica* **a Separate Species ?**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1940. Jan. 16. Vol. 80. No. 3. pp. 131–137.

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## HELMINTHIASIS.

### *PRÉCIS* OF ABSTRACTS IN THIS SECTION.

*Ascaris infection, etc.*—SCOTT (p. 647) shows that 80 per cent. of the inhabitants of the Nile delta are infected with Ascaris. The infection is evenly spread but the intensity is not so high as in the family infections of other countries. Transmission is by direct hand to mouth transfer of eggs which have developed on moist floors, and women and children therefore have more infection than men. MOMMA *et al.* (p. 648) report on hexylresorcinol in the treatment of Ascaris infection.

BOTSFORD *et al.* (p. 648) report the association of appendicitis and *E. vermicularis* infection of the appendix in children. Symptoms of acute appendicitis may be produced by this infection even when after excision the appendix is found not to be inflamed. The two conditions cannot be clinically differentiated and the safest treatment is appendicectomy. SCHWARZ and STRAUB (p. 649), however, emphasize the definite pathological conditions of the appendix caused by Enterobius. WRIGHT and BRADY (p. 649) find that gentian violet is the best treatment for Enterobius infection and give details of the methods used. With BOZICEVICH they (p. 649) give the results of other treatments tested.

GALLIARD (p. 650) discusses the reasons for the observed rarity of infection of dogs in Tonking with Strongyloides, since dogs are easily infected from human sources and the evidence available points to the identity of the canine and human forms.

*Filariasis.*—YOKOGAWA and YUMOTO (p. 650) give figures of the incidence of filariasis in Isigaki Island. YOKOGAWA *et al.* (p. 651) have

found infection with *W. bancrofti* in the Pescadores. TOUMANOFF *et al.* (p. 651) show that infection with *Mf. malayi* is present in the highlands of Upper Tonking; infected *Anopheles minimus* and *A. jeyporiensis* have been found.

KOBAYASI (p. 651) gives the results of a study of the structure of *Mf. bancrofti*. YOKOGAWA (p. 652) adds a further note on the subject of the penetration of the skin by larvae of *W. bancrofti* from the proboscis of mosquitoes. He claims that the larvae do not penetrate the intact skin and rarely penetrate through the puncture caused by the mosquito bite if one or two of the deeper layers of the skin are intact.

IYENGAR (p. 652) describes a method of preparing blood films which avoids distortion of microfilariae. He discusses the nomenclature of *Mf. malayi*, suggesting that it be placed in the genus *Filaria*, but LANE in comment cannot regard this as admissible and points out that the term *Microfilaria* is used as a clear and legitimate word covering the larval forms of any "filaria."

GORDON and LUMSDEN (p. 653) have devised a method by which they have watched the mouth parts of *Aëdes aegypti* during the process of taking up blood from the tissue of the web of frogs' feet. The movements of the labrum were observed and it was found that an active and purposeful bending of the distal fifth took place which enabled the tip to enter a capillary, though this result is apparently accidental, since the labrum may pass right through a capillary. Feeding may take place directly from a capillary or from a pool of blood in the tissues, in which case it is slower. The frogs were infected with *Foleyella dolichoptera*, the microfilariae of which were present in the blood and it was found that the stomachs of mosquitoes which had fed from capillaries contained more microfilariae than those of mosquitoes which had fed from pools of blood. The explanation suggested is partly that microfilariae are unevenly congregated in the capillaries and partly that microfilariae escape less readily than blood cells from the capillaries.

KNOTT (p. 655) states that the primary lesion of filariasis is a sterile inflammatory reaction, which occludes the lymphatic vessel, about a dead worm. The lymphatics of the testis are especially vulnerable, and lymph stasis in this region may be the only sign of the disease. He details the changes which may be found. Hydrocele is the most common filarial disorder to induce the patient to seek advice and the author indicates methods of treatment.

YOKOGAWA *et al.* (p. 655) show that Pandit's adhesion reaction in filariasis depends to some extent on the blood groups of the sera used.

CHOPRA and RAO (p. 656) found atebrin and plasmoquine to be ineffective in the treatment of filariasis but fouadin caused temporary reduction in the numbers of *Mf. bancrofti* in the blood and controlled the inflammation and fever for a comparatively long period of time. Soamin, though causing no diminution in the numbers of microfilariae, was useful in controlling fever and inflammation.

MORALES (p. 656) reports the sheathless and non-periodic *Mf. demarquayi* in the blood of patients in Bolivia.

BRUYNOGHE (p. 657) discusses LANE's hypothesis of daily birth and daily destruction of the larvae of *W. bancrofti* in the light of his own work with *D. immitis*. He reports work which shows that the introduction of adult *D. immitis*, or the injection of microfilariae, into the peritoneum of rabbits and guineapigs does not result in positive serological or skin tests. Antigen reactions therefore vary with the

host and perhaps with the parasite. BROWN and AUSTIN (p. 657) report that the trivalent antimony compound Stibsol has proved effective in sterilizing the blood of dogs infected with *Dirofilaria immitis*, apparently by killing the mother worms.

MIRA (p. 658) reports *Simulium damnosum* in Abyssinia and advises a search for onchocerciasis there.

GREIG (p. 658) records the radiological appearances of apparently calcified *Loa loa* in human tissues.

LINDBERG (p. 659) has found infection with embryos of *D. medinensis* only in *Mesocyclops vermifer* in water tanks in the Deccan. He (p. 659) gives a list of fish which are found in these tanks.

*Trichinella infections, etc.*—In a summary of trichiniasis in the *Journal of the American Medical Association* (p. 659) it is stated that 18 per cent. of diaphragms examined at post mortem in the U.S.A. show larvae. ROTH (p. 660) shows that a small infection with *T. spiralis* gives some immunity, in guineapigs, against a subsequent larger dose, and that this immunity is due to an intestinal defensive mechanism. LICHTERMAN and KLEEMAN (p. 660) show that the intradermal test for trichiniasis in pigs results in an error of less than 3 per cent. in diagnosis.

SWARTZWELDER (p. 660) describes the symptoms present in 81 uncomplicated cases of infection with *Trichuris trichiura*. MAPLESTONE and MUKERJI (p. 661) find that the forms of iron commonly used in the treatment of anaemia are of no value in the treatment of Trichuris infection. The value of D.C.F. and of the Stoll technique in diagnosis is discussed.

SKRJABIN (p. 662) describes human infection with *Thominx aerophilus*, a nematode of the family Trichocephalidae, which is usually found in the lungs, trachea and nasal cavities of carnivorous animals. Eggs were present in the sputum. *C. W.*

SCOTT (J. Allen). **Observations on Infection with the Common Roundworm,** *Ascaris lumbricoides*, **in Egypt.**—*Amer. Jl. Hyg.* 1939. Nov. Vol. 30. No. 3. Sect. D. pp. 83–116. With 7 maps & 3 graphs. [32 refs.]

"That the conditions of infection with *Ascaris lumbricoides* in Egypt are in many respects unique has been shown by studies based on an analysis of over two million examinations in government treatment centers, on nearly 40,000 egg counts made under the author's supervision, as well as on numerous soil isolations and other studies of local conditions. In all, about six million of the fifteen million people are infected. In the Nile valley only about 20 per cent. of the rural people are infected, but in the delta the average prevalence is about 80 per cent. Even in the latter district the average number of worms harbored is low as compared with most countries while, where the prevalence is low, the intensity is below that recorded for any other endemic area. In regions of low prevalence in most countries the infections are concentrated in a few families and, therefore, the intensity in the infected persons is as high as where the prevalence is high. In Egypt, however, the infection is evenly spread through all of the families of the compactly built villages, with the result that over the country as a whole the intensity is directly proportional to the prevalence. In spite of the lack of concentration in families the infection is transmitted primarily by direct hand-to-mouth transfer of eggs which have developed on the moist floors, and thus the women and children tend to have more infection than the men."

"The farthest the great majority of rural people get away from the ground while resting is when the men squat on a raised platform of dried mud on which a straw mat is sometimes spread. Isolations from these platforms and mats have frequently shown embryonated ascaris eggs to be present."

MOMMA (Kenji), YAMASHITA (Jirô) & KAMITANI (Kiyoshi). **Hexylresorcinol and Alantolacton in Therapy of Human Ascariasis.**—*Livro Jubilar do Prof. L. Travassos.* Rio de Janeiro. 1938. Reprinted in *Collected Papers from the Faculty of Medicine, Osaka Imperial University.* 1938. pp. 101–105. [12 refs.]

A reproduction of a paper, from the Travassos Jubilee publications, that reported on 90 cases of Ascaris infection treated with hexylresorcinol. Over 50 per cent. showed ill effects and cures varied from 30 to 65 per cent. in different groups; while the figures (reported without comment) show that the higher was the dose the lower was the cure rate. From alantolacton no satisfactory results were got.

*Clayton Lane.*

ASENJO (Conrado F.). **The Latex of *Ficus pumila* L. I. History, Proximate Composition and Anthelmintic Properties.**—*Puerto Rico Jl. Public Health & Trop. Med.* 1939. Dec. Vol. 15. No. 2. pp. 141–170. With 6 figs. [59 refs.] [Spanish summary p. 171.]

The latex of *Ficus pumila* contains as is known a substance which dissolves Ascaris. This proteolytic substance resides in the protein fraction, but on purifying this fraction its activity is lost. *C. L.*

MACHEBOEUF (M.) & MANDOUL (R.). Tentative d'isolement de la substance toxique contenue dans l'extrait d'*Ascaris megalocephala.* Quelques observations au sujet des propriétés de cette substance. [**Attempts to isolate the Toxic Substance contained in Extract of *A. megalocephala.* Notes on its Properties.**]—*C. R. Soc. Biol.* 1939. Vol. 132. No. 23. pp. 124–126.

The toxin [this *Bulletin*, 1939, Vol. 36, p. 724] though powerful is so fragile that it has not been isolated. It is not the "ascaron" of SHIMAMURA and FUJII [this *Bulletin*, 1917, Vol. 10, p. 117] which is probably a product of autolysis. *C. L.*

BOTSFORD (Thomas W.), HUDSON (Henry W.), Jr. & CHAMBERLAIN (John W.). **Pinworms and Appendicitis.**—*New England Jl. of Med.* 1939. Dec. 14. Vol. 221. No. 24. pp. 933–936. With 2 figs. [23 refs.]

"Seventy-one of 1,343 appendices removed at the Children's Hospital, Boston, from 1929 to 1939 were infected with pinworms.

"Microscopical as well as gross inspection of the appendiceal contents is advocated in order to find the parasites.

"Twenty-six patients had acute appendicitis and pinworm infection. The cases differed in no way from the usual picture of acute appendicitis in children.

"Forty-five patients had no inflammatory change in the appendix but had pinworm infection. All had abdominal pain and all were relieved by appendectomy.

"Twenty-nine of the 30 patients who had chronic abdominal pain were relieved by appendectomy.

"Twenty-two patients who had no histological evidence of appendicitis but had pinworm infection of the appendix presented a syndrome exactly like that of acute appendicitis.

"Pinworm infection of the appendix cannot be differentiated with certainty from acute appendicitis. It may be suggested by a history of pinworm infection and recurrent abdominal pain.

"The mechanism of the mode of action of pinworms in the appendix is unknown.

"The safest treatment of appendiceal symptoms due to pinworms is appendectomy."

SCHWARZ (Jan) & STRAUB (M.). Oxyures en appendicitis. [**Enterobius and Appendicitis.**]—*Nederl. Tijdschr. v. Geneesk.* 1940. Apr. 27. Vol. 84. No. 17. pp. 1627–1634. With 10 figs. on 2 plates. [22 refs.] English summary.

"1. Oxyurids are often found in the appendix especially in young persons.

"2. The worm regularly occasions characteristic lesions of the epithelium and in the mucosa.

"3. When the parasite penetrates into the deeper layers of the wall it causes abscess formation and foreign body reaction. Incapsulation and calcification follow.

"4. The reactionless immigration described by most authors is a post-vital process.

"5. Oxyurids are often found in appendices with signs of purulent inflammation.

"6. The opinion of BRUMPT and of RHEINDORF that oxyurids are a very important primary cause for appendicitis and that therefore an anti-oxyuris campaign would be of social importance, deserves serious consideration."

WRIGHT (Willard H.) & BRADY (Frederick J.). **Studies on Oxyuriasis. XXII. The Efficacy of Gentian Violet in the Treatment of Pinworm Infestation.**—*Jl. Amer. Med. Assoc.* 1940. Mar. 9. Vol. 114. No. 10. pp. 861–866. [23 refs.]

Tested on 224 persons the relatively cheap gentian violet treatment was better than all (and far better than some) other treatments checked by the same tests.

The test was the celophane NIH swab. The drug was given in daily doses of 192 mgm. for adults before meals and to children at the rate of 10 mgm. a day for each year of apparent, not actual, age. The aim was to treat all infected members of a family. Re-examination was made 10 to 48 days after treatment. The treated fell into four sections, and unworming was effected in 58, 79, 90 and 91 per cent. The last had treatments for ten consecutive days, the last but one had two sets of treatment for 8 days each, with a week's rest between. Some of the treated showed nausea, vomiting, diarrhoea and abdominal pain quickly ceasing when treatment ceased for a day or two or when the dose was reduced. *C. L.*

WRIGHT (Willard H.), BRADY (Frederick J.) & BOZICEVICH (John). **Studies on Oxyuriasis. XIV. Controlled Tests with Various Methods of Therapy.**—*Public Health Rep.* 1939. Nov. 10. Vol. 54. No. 45. pp. 2005–2016.

An attempt to eradicate threadworm infection by discovering and treating all the members of a family.

Diagnosis was by the NIH celophane swab used if possible on seven consecutive days. As to treatment these were the results. Santonin was given to 20 in one daily dose for 10 days, 9 were still positive. Enemas of hexylresorcinol, 1 in 2,000 in water, were given in varying numbers to 27 and 18 became negative; the minimum number for success is 10, spread over three weeks. Hexylresorcinol by mouth, as caprokol pills repeated weekly after three weeks, left 3 of 4 patients infected. One ounce of 1 in 1,000 caprokol jelly put in the rectum at bedtime left 8 of 8 patients infected. Non-medicated soap or saline enemas may be satisfactory in infants and young children if given every other night for not less than three or four weeks, but the course has often to be much longer. Anal ointments are of little or no use in unworming. *C. L.*

GALLIARD (Henri). Recherches sur la Strongyloidose au Tonkin. Rôle des animaux domestiques dans l'étiologie de l'infestation humaine. [**Infection by Strongyloides in Tonking. Domestic Animals and Infection in Man.**]—*Ann. de l'Ecole Supérieure de Méd. et de Pharm. Indochine.* 1938. Vol. 2. pp. 104–112. With 4 figs. on 2 plates. [13 refs.]

Strongyloides infection is not simple, as is that of hookworm, and has further surprises for us.

Although, in Tonking, Strongyloides infection is exceptional in dogs and cats, these are very readily infected from human sources and the effects are very serious and often mortal in young animals, even within 12 days in a massive skin infection, while after infection the female parasites may live and pass larvae for 4 months; moreover, other dogs in contact with those infected from man become themselves infected. The rarity of reported natural infection in the dog is explicable either as a result of little exposure to such infection or to lack of investigation. Galliard's local experiments show that in dogs infected from man both direct and indirect cycles of development occur at first, but as passage succeeds passage through dog only the indirect cycle persists, that is to say a free living adult stage becomes necessary. All this points to an identity of the canine and human forms and adds to the mystery of the rarity of natural infection in the dog. *C. L.*

LAWLER (Harry J.). **Passive Transfer of Immunity to the Nematode,** *Strongyloides ratti.*—*Amer. Jl. Hyg.* 1940. Mar. Vol. 31. No. 2. Sect. D. pp. 28–31.

YOKOGAWA (Sadamu) & YUMOTO (Yosika). **Investigations on the Incidence of Filariasis in Isigaki Island, Okinawa Prefecture.**—*Acta Japonica Med. Trop.* Formosa. 1939. May. Vol. 1. No. 1. pp. 19–28.

Of a population of 4,040 the night blood of 569 was examined, 0·1 cc. being taken from the ear of each on four slides. The displayed infection rate averaged 28·47 (21·88 to 35·55) in different groups. As graded by microfilaria counts, the weights of infection among those in whom infections were displayed were—1 to 10 microfilariae in this amount of blood 41·36 per cent., 11 to 100, 30·25 per cent., 101 to 500, 22·22 per cent., over 500, 6·17 per cent. Figures for locality, sex and age are given. *C. L.*

YOKOGAWA (Sadamu), KOBAYASI (Hidekazu), YUMOTO (Yosika), OSAKA (Kiyosi), RO (Mantoku) & YOKOGAWA (Muneo). **Epidemiological Investigations on *Wuchereria bancrofti* in the Hōko Islands (Pescadores).**—*Taiwan Igakkai Zassi* (*Jl. Med. Assoc. Formosa*). 1939. Oct. Vol. 38. No. 10. [In Japanese pp. 1452–1464. With 1 map. English summary pp. 1465–1466.]

It seems to have been believed that filariasis was not present in these islands, but a report that it was led to investigation by this team in the summer of 1938.

Blood was examined at night from, it seems, over 2,000 children. Infection rates in different islands varied from 0·85 to 11·22. Most of the infections were very light (1 to 10 microfilariae in 0·1 cc. of night blood is the standard adopted) or light (11 to 100 microfilariae). Further statistics of local interest are given. *Culex fatigans* is common, 1 of 29 female specimens contained infective larvae, believed evidently to be those of *W. bancrofti*. *C. L.*

TOUMANOFF (C.), TRY (H. T.) & CHANG (T. L.). Au sujet de l'existence de *Filaria Malayi* et *F. bancrofti* dans la Haute-Région tonkinoise et du rôle probable des diverses espèces culicidiennes dans la transmission de la filariose humaine. [**The Frequency and Transmission of Filariasis in Upper Tonking.**]—*Rev. Méd. Française d'Extrême-Orient.* 1939. Aug.–Sept. No. 7. pp. 871–876.

The night blood of prisoners at Hagiang and at Laokay in upper Tonking, and at Tuyên-Quang in middle Tonking, gave these microfilarial percentages: Hagiang 223 prisoners, *Mf. bancrofti* 4·48 per cent. and *Mf. malayi* 6·72 per cent.; Laokay 142, 3·52 and 4·22; Tuyên-Quang 51 prisoners *Mf. bancrofti* 11·16, *Mf. malayi* 0; *Mf. malayi* is then present in the highlands and there dissection of 1,830 *A. minimus* has shown 3 filarial infections. Other figures are mostly vague but between 1931 and 1938 this mosquito was found infected (usually in the proboscis) 21 times, 16 of them being at Hagiang where 3 infections were found in *A. jeyporiensis*. Again *A. minimus* contained human blood in 93 and *A. jeyporiensis* in 97 per cent. of collections at Hagiang. Comparison is made with Jackson's work at Hong Kong [see this *Bulletin*, 1937, Vol. 34, p. 459]. *C. L.*

KOBAYASI (Hidekazu). **Supplementary Study regarding the Organisation of *Microfilaria bancrofti*.**—*Acta Japonica Med. Trop.* Formosa. 1939. Dec. Vol. 1. No. 2. pp. 193–202. With 2 plates. [23 refs.]

"A modified staining method using Giemsa's dye was successfully employed which gave better results than those previously used. There are 4 primordial cell groups besides the excretory and G-cells in the nucleal column, which lie along the longitudinal axis of the microfilaria. (*a*) The primordial cells of the anterior oesophagus consist of 2 cells situated anteriorly to the nerve ring. (*b*) The primordial cell group of the posterior oesophagus is situated at about the centre of the microfilaria and consists of several cells arranged chiefly in a short oval form. (*c*) The primordial cell group of the posterior oesophagus consist of several cells arranged in a short oval form or in 2 columns of cell rods. (*d*) The genital anlage is situated at the ventral side near the primordial cells of the posterior

oesophagus and mid-intestine at a point varying from 39·54–53·19 per cent., average 45·88 per cent., from the head of the larva and has no relationship with the G cells."

YOKOGAWA (S.). **Transmission of** *W. bancrofti.* [Correspondence.]—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1939. Nov. 25. Vol. 33. No. 3. pp. 363–364.

In continuation of an earlier paper [this *Bulletin*, 1939, Vol. 36, p. 836] Yokogawa reports that mature larvae were dissected from "mosquitoes in normal saline" and placed on the skin of 5 volunteers, the author among them, and on that of mice rendered hairless by "Eva cream"; they died without penetrating. Mature larvae "set free from the proboscis of infected mosquitoes on to the surface of the skin of mice" live longer, some entered the puncture caused by the mosquito bite but it seems that if even only one or two of the deeper layers of the skin were intact they rarely penetrated. After entering the skin through the puncture wound they migrate not only along the lymphatic spaces but also indiscriminately in the tissues, and in mice they become "degenerate and enveloped by fibroblasts within 15 hours of the infecting bite." Of five volunteers bitten by infected mosquitoes "in one case 82 days after the infection and in another case 111 days after a first and 56 days after a second infection, two microfilariae were recovered from 2·0 cc. of blood examined at night" and thereafter no more in nightly examinations over several weeks. "The author is of opinion that the larvae may become adult and produce microfilariae in 20–30 days after the infection."

"Microfilariae will, however, find difficulty in entering the peripheral blood, because they are liable to be retained by the reticulo-endothelial system of the host, before it is completely blocked. Consequently it is believed that the periodicity of microfilariae is chiefly controlled by diurnal and nocturnal alteration in the physiological function of the reticulo-endothelial system."

[Did the experiments on man take place in a non-endemic area and on persons who had never been out of such an area?] *C. L.*

IYENGAR (M. O. T.). **Differentiation of Microfilariae of** *Wuchereria bancrofti* **and** *Filaria malayi.*—*Indian Jl. Med. Res.* 1939. Oct. Vol. 27. No. 2. pp. 563–571. With 6 plates. [14 refs.]

A well figured contrast of the shape, size and structure of *Mf. bancrofti* and *Mf. malayi.*

To avoid distortion and shrinkage on drying of the blood film, the following method is advised:—

"A drop of blood from a carrier is taken on a slide and mixed with a drop of normal saline; one or two small crystals of menthol are placed in the blood and the slide left in a moist chamber. When all the microfilariae have been fully narcotized (which usually takes about half an hour) and are in a well-extended condition, the menthol crystals are removed and the blood spread out to form a smear and then quickly dried. The smear is then placed in water to dissolve out the haemoglobin, fixed with $Ble_s$ solution, stained with haematoxylin, and counterstained with eosine."

*Mf. actoni* and the atypical form of *Mf. bancrofti* of Korke (1929) are classed as synonyms of *Mf. malayi.* As to the nomenclature, this sentence occurs:—

"In an editorial note in the *Ind. Med. Gaz.*, 1937, Vol. 72, p. 734, an opinion was expressed that it was inadmissible to place this species under the genus *Filaria* as it had been described only from the larval form, and it was suggested that it should be termed *Microfilaria malayi*. The term *Microfilaria* is not a systematic unit and is therefore not a 'genus' (*vide* Baylis and Daubney, 1926). Like the term *Agamofilaria*, it is only a collective group meant for the sake of convenience to accommodate species of *Filariidae* described from larval forms in cases where the authors are doubtful of the generic position. Since, however, the author of the species *Filaria malayi* had placed it under the genus *Filaria*, there is no justification now for changing the name to *Microfilaria malayi*, merely because it was described from the larval form."

[The matter is less simple than this. As Article 30 of the Code of Zoological Nomenclature suggests, every genus must have a type species, and if the original name of the genus did not designate this, it is open to someone else to do so. When MÜLLER named the genus *Filaria* in 1787 he gave it no type species. This omission was rectified by STILES and HASSALL in 1905 and *Filaria martis* Gmelin, 1790, was designated by them as type species. To use the term *Filaria malayi* implies, then, a conviction that the parent worms fall morphologically within the same genus as *F. martis*; but the parent worms of this microfilaria are unknown and quite certainly cannot with confidence be placed in the same genus as *F. martis*. That BRUG used the term "*Filaria malayi*" is, then, not binding in zoological nomenclature. In 1913 the International Commission on Zoological Nomenclature made this Recommendation regarding Article 8 of the Code: "Certain biological groups which have been proposed distinctly as collective groups, not as systematic units, may be treated for convenience as if they were genera, but they require no type species. Examples: *Agamodistomum*, *Sparganum*." The worm *Microfilaria* is not used to cover a systematic unit, but provides medical men with a convenient, clear and legitimate word to cover these larval "filarial" worms, among which without overstrain *Mf. malayi* falls.] *C. L.*

GORDON (R. M.) & LUMSDEN (W. H. R.). **A Study of the Behaviour of the Mouth-Parts of Mosquitoes when taking up Blood from Living Tissue; together with Some Observations on the Ingestion of Microfilariae.**—*Ann. Trop. Med. & Parasit.* 1939. Dec. 30. Vol. 33. Nos. 3 & 4. pp. 259–278. With 13 figs. [17 refs.]

By ingenious apparatus, and after an appetizer of human blood, the feeding of mosquitoes on the web of frogs whose blood contained microfilariae has been watched under the microscope. The results are illuminating.

The frog *Rana sphenocephala*, the North American leopard frog, was naturally infected with *Foleyella dolichoptera*, the adults living in the retroperitoneal space, the microfilariae circulating in the blood. Suitable specimens were those with the least skin pigment. The mosquitoes were the females of *Aëdes aegypti*, fed for several days on raisin, and starved for 48 hours, but even then they could not be induced to feed on frog unless they were given 30 seconds on man and then at once transferred to frog, when 34 of 100 did so. However, this subterfuge was not effective in getting any *Anopheles maculipennis atroparvus* or *Culex molestus* to bite frog. The apparatus, clearly illustrated, consists of the means of bringing together under the microscope the frog's web and the mosquito. The web was stretched

by tapes attached to clips on the frog's toes; the mosquito was put in a bulbed observation tube, the bulb having a window covered with mosquito netting, this window being brought up against the under side of the stretched web and the process watched from above with a $1\frac{1}{2}$ inch or a $\frac{2}{3}$ inch objective and $\times$ 5 or $\times$ 10 eyepiece respectively.

After describing the observed preliminaries to penetration of the fascicle past the frog's skin, and noting that after penetration the mandibles could not be identified, the movements by which the labrum and maxillae move through the tissues are detailed. No author, it is noted, has referred to the marked active and purposive bending of the distal fifth of the labrum, a searching movement; and along the track it makes the rest of the labrum curves passively. The fascicle is not driven vertically into the tissues but its tip turns towards the horizontal and enters a capillary. This entry seems to be accidental, for the fascicle may pass right through a capillary.

Feeding is of two kinds. There is "capillary feeding" when the fascicle takes blood direct from the lumen of a capillary. There is "pool feeding" when, after the fascicle is withdrawn from a capillary, blood escapes into and forms a pool in the tissues, constantly replenished by a fresh outflow of blood, which is taken up by the insect. The latter feeding takes about 3 times as long to effect engorgement of the stomach as the former—ten minutes as against three. It is thought that salivary secretion is injected throughout the feeding.

Microfilariae may, as AUGUSTINE, FIELD and DRINKER reported [this *Bulletin*, 1937, Vol. 34, p. 35], hold their positions in capillaries by pressing their convolutions against the wall, though they were not observed to progress against the stream, but the speed with which the blood was taken up from a capillary precluded study of details. The great variations in numbers of microfilariae which different mosquitoes, feeding on the same host at the same time, may imbibe is emphasized by reproduction of tables from O'CONNOR and BEATTY [this *Bulletin*, 1937, Vol. 34, p. 884] in which the difference has been as much as 9 and 738. It is shown that with pool feeding the number of microfilariae found in the stomach of Aëdes was less than with capillary feeding. But in the small number of meals when only capillary feeding took place, there were yet large variations in microfilarial numbers in the stomachs; as explanation it is reported that microfilariae were often congregated in large numbers in a short length of capillary while there were very few in an adjacent one; and this is held to be a probable explanation of the apparent power of a mosquito to take up more microfilariae than are present in a stomachful of finger-prick blood—a contributing factor being the possibility that, when the finger is pricked, microfilariae will escape from the capillaries less readily than do the corpuscles. Observation of the act of biting lends no support to the suggestion that entanglement of microfilariae round the proboscis has any effect in this concentration. [Would it not be worth while to search the special observation tubes for yet another possible reason for the concentration of microfilariae in the stomach of Aëdes? The explanation of the authors of the relative fewness of microfilariae in finger blood and in "pool" blood is that they escape from capillaries less readily than do red cells. In the same way it is reasonable to suppose that having got into the "stomach" of the mosquito they pass on into the "intestine" less readily than do red cells. Yet O'CONNOR and BEATTY (this *Bulletin*, 1938, Vol. 35, p. 761) wrote "During, and soon after feeding, sheathed microfilariae (*Mf.*

*bancrofti*) are passed by *C. fatigans* per rectum." If microfilariae are passed during feeding, red cells are presumably passed yet more readily, with the result of a concentration of the larvae in the mosquito's stomach beginning even during the feed.] *C. L.*

KNOTT (James). **Filariasis of the Testicle due to** *Wuchereria bancrofti.* —*Trans. Roy. Soc. Trop. Med. & Hyg.* 1939. Nov. 25. Vol. 33. No. 3. pp. 335–347.

"The primary lesion of filariasis is a sterile inflammatory reaction about a dead worm, in a lymphatic vessel. The vessel is occluded and there results an obliterative lymphangitis which causes dilatation, hypertrophy and varicosity, with peripheral lymphstasis. The lymphatics of the testicle are especially vulnerable to such lesions, for they are quite long, have no collaterals, and drain against gravity. Lymphstasis in the testicle is shown by definite clinical signs in the cord, epididymis and testis, which are often the only signs of filariasis demonstrable on physical examination.

"A patient with early filariasis may show (1) no demonstrable signs whatever (subclinical stage), (2) enlargement of the inguinal and sub-inguinal (femoral) lymph nodes, (3) thickening and lengthening of the spermatic cord, due to hypertrophy and varicosity of the lymphatics, (4) enlargement and firmness of the epididymis, often with definite nodular thickenings, (5) partial or complete obliteration of the sinus epididymis, (6) enlargement of the testis and loss of its elastic firmness, due to oedema, (7) increased fluid in the tunica vaginalis, (8) thickening of the base of the scrotum due to oedema of the ligamentum testis (gubernaculum).

"A hydrocele is the filarial disorder which most commonly brings the patient to the physician. The lining membrane of the sac can be obliterated by injection treatment or by open operation. Injection treatment is suitable for the small, flaccid, thin-walled sacs, but operation is better for the others. Filariasis of the testicle is always bilateral, and both testicles and both inguinal rings should be exposed and treated whenever an operation is done for hydrocele or hernia in a filarial subject. A transverse suprapubic incision gives adequate exposure for this procedure, and has other advantages."

YOKOGAWA (Sadamu), KOBAYASI (Hidekazu) & YOSINO (Takayosi). **On Pandit's Reaction of the Serum of Elephantiasis to** *Microfilaria bancrofti.*—*Acta Japonica Med. Trop.* Formosa. 1939. Dec. Vol. 1. No. 2. pp. 185–192. [18 refs.]

The phenomenon investigated is that in which, when blood containing microfilariae is mixed with serum from another person and stood at room temperature for an hour or more, the microfilariae become sluggish and coated with adherent leucocytes [this *Bulletin*, 1930, Vol. 27, p. 989].

"Even though it is difficult to advance an explanation of the cause of adhesion of blood cells to the microfilariae, it is obvious that *Pandit's reaction* is controlled by the blood group of the serum to be tested, and by the suspension of microfilariae and blood cells, in accordance to the data collected which reveal that, in 8 out of the 9 cases where adhesion of blood cells to microfilariae occurred within 2 days, the sera added were of different blood groups from that of the blood suspension, while in those where the phenomenon took place between sera and blood cell suspension of the same blood group, this did not occur before 5 days." *C. L.*

CHOPRA (R. N.) & RAO (S. Sundar). **Chemotherapy of Filarial Infection.**—*Indian Jl. Med. Res.* 1939. Oct. Vol. 27. No. 2. pp. 549–562. [12 refs.]

Although no satisfactory antifilarial drug has yet been found, soamin and fouadin have given benefit in certain directions.

The authors have tested 72 drugs, cobra and viper venom, human and monkey malaria. Although both the Bancroftian and Malayan infections are mentioned, the tests seem to have been done on the former, essentially on the microfilariae. Since from the blood these were obtainable in numbers at night only and some 12 hours had to pass before the tests were made on them, by which time they were less active, the *in vitro* tests were made on microfilariae freshly got from hydrocele fluid. In these conditions and in dilution of 1 in 10,000, atebrin and plasmoquine, as brought out in the text, killed the embryos in 10 seconds, whereas with fouadin and soamin they were alive though sluggish an hour later ; on the other hand atebrin in 15 daily oral doses of 0·1 gm. and plasmoquine in 10 daily doses of 0·025 gm. had no effect on the numbers of circulating microfilariae.

Again, as regards these last, soamin had no effect while fouadin caused a purely temporary reduction. The authors' own words are :

" Fouadin gave the most satisfactory result . . . . The effect of the drug on the filarial parasite appears to be only temporary as the microfilariae re-appear in the blood after a lapse of a few days. This drug is very useful in controlling the inflammation and fever in filarial patients for a comparatively long period of time." And regarding soamin " The belief entertained by some practitioners that the drug causes optic atrophy appears to be without foundation. In a very large number of patients treated by us at the School with this drug not a single case of such untoward result has been observed so far. Although there does not appear to be any appreciable diminution in the number of microfilariae even after a full course, the clinical effects obtained with this drug are very satisfactory. In some cases the patients have remained free from fever and inflammatory attacks for several years after one course of soamin. As compared with other antifilarial drugs soamin is cheap and can be administered easily. It is, therefore, the most suitable among the arseno-compounds for treatment of filariasis."

*C. L.*

MORALES (Ovidio Suarez). Microfilariosis en Monteagudo (Chuquisaca, Bolivia). [**Microfilariae in Monteagudo, Bolivia.**]—*Prensa Méd. Argentina.* 1939. Sept. 20. Vol. 26. No. 38. pp. 1838–1841. With 2 figs.

The microfilaria was identified by MAZZA as *Mf. demarquayi.*

Although filarial infection has never been reported from Bolivia there were found microfilariae in the blood of a patient examined for malaria. Thereafter these microfilariae were found in 4 of 6 patients coming from that locality. They have no sheath and are present in the blood by day and night. There is a spoonshaped head free of nuclei and a filiform tail. The microfilaria measures 167$\mu$ (114$\mu$ to 204$\mu$) long by 3·2$\mu$ (2·3$\mu$ to 3·5$\mu$) wide at the anus. *C. L.*

BRUYNOGHE (G.). Recherches sur les propriétés antigéniques des microfilaires de *Dirofilaria immitis*. [**The Antigenic Properties of** *Mf. immitis*.]—*Arch. Internat. Méd. Expérim.* 1939. Dec. Vol. 14. No. 1. pp. 29–39. [40 refs.] Also in *Ann. Soc. Belge de Méd. Trop.* 1939. Sept. 30. Vol. 19. No. 3. pp. 335–353.

Injections of blood containing *Microfilaria immitis* produce no evidence of circulating antibodies when injected into rabbits, guineapigs or dogs, but do so in man infected with *Loa loa*.

Working in Antwerp and Louvain where there is no indigenous dirofilarial infection, and working on an imported dog which had this, the author discusses the work of others before reporting his own. He notes that almost all the recent work of injecting blood containing microfilariae has been undertaken to test the reviewer's hypothesis that microfilarial periodicity is due to daily birth and daily destruction of these larvae. The work of MURGATROYD and of HANSCHELL who injected *Mf. bancrofti* into man and into guineapig, with their prompt disappearance, is in favour of this hypothesis, He refers to KNOTT's injection of the same microfilaria into man with their persistence for 14 days but notes that, since this occurred in an endemic area, the finding is inconclusive. As to *Mf. immitis*, Lane's hypothesis cannot be exact and the author adds experiments of his own in which after blood containing these microfilariae had been injected [? intravenously] into rabbits and dogs they were found circulating for 8 days and for one or two weeks respectively, but when injected intraperitoneally into guineapigs they were never found in the blood. These experiments of his were, however, by the way. The real ones were undertaken to investigate antigens. When, spread over a month, 900,000 microfilariae were injected into two rabbits, a test made a week after the injections ceased showed in the serum no precipitins and no complement deviation and in the skin no reactions to antigen.

When two adult worms from the dog were placed in the peritoneum of a rabbit, there was no eosinophilia, no microfilariae in the blood, and no reactions to antigen. When, spread over a month, 400,000 microfilariae were injected into the peritoneal cavity of a guineapig, serological tests and skin reactions were completely negative. There was no evidence in these animals of any production of antibody or any skin reaction. He checked his technique and the efficacy of his antigen by injections of the antigen (an alcoholic extract from Dirofilaria itself and a watery one from the microfilariae) and found the former always and the latter generally effective in Loa infections, thus confirming FAIRLEY's work. Antigen reactions vary then with host and perhaps with parasite, and do not permit conclusions as to the real importance of microfilariae in producing the reactions characteristic of filariasis in man. *C. L.*

BROWN (Harold P.) & AUSTIN (James A.). **Treatment of Heartworms in Dogs with Stibsol—a New Drug.**—*Jl. Amer. Vet. Med. Assoc.* 1939. Nov. Vol. 95. No. 752. pp. 566–569.

Stibsol has proved effective in sterilizing the blood of dogs infected with *Dirofilaria immitis*.

Stibsol is an American product, a trivalent antimony compound containing sulphur, and described as " antimonial-3-catecholthiosalicylic-acid-sodium " ; it contains 30 per cent. of antimony and is put

up in a strength of 8·5 mgm. per cc. in a solution buffered to a *p*H rather higher than that of blood. The dose advised in a dog of 55 lbs. is 2·5 cc. rising to 5 cc. during a course of seven injections. There has been an increase in the numbers of microfilariae in the blood after the second or third injection, and again just before microfilariae finally disappear from the blood. Of the 15 dogs treated three died, with dead adult worms in the heart, in one there being a large organized clot round them and in another the dead worms extending into the lungs. The dogs that were cured were evidently not killed and examined. [The incomplete evidence is that the drug cleared the blood of microfilariae by killing the mother worms so that the young were no longer born. It evidently killed the host by stopping the blood circulation mechanically, the result of the death of the worms in the heart or by their being carried after their death as emboli into the lungs. These risks would be absent were it felt right to try the drug in *W. bancrofti* infection in man.] *C. L.*

MIRA (Mario Giaquinto). Presenza del *Simulium damnosum* Theobald in varie località del territorio dei Galla e Sidamo e possibile esistenza di focolai di Oncocercosi fra le popolazioni indigene di alcune regioni dell' A.O.I. [*S. damnosum* **is present in Parts of Galla and Sidamo,** *Onchocerciasis* **is possibly present.**]—*Arch. Ital. Sci. Med. Colon. e Parassit.* 1939. Dec. Vol. 20. No. 12. pp. 657–662.

The author's collection of blood-sucking insects in Abyssinia made from 1936 to 1939 includes *Simulium damnosum* from the valleys of the Omo, Bottego and Didessa which adjoin Kenya. There is then need to determine whether onchocerciasis exists there. *C. L.*

DE MEILLON (Botha). **New Simuliidae from Kenya.**—*East African Med. Jl.* 1940. Mar. Vol. 16. No. 12. pp. 446–449. With 4 figs.

SMART (John). **Simuliidae (Dipt.) from British Guiana and the Lesser Antilles.**—*Trans. Roy. Entom. Soc. London.* 1940. June 15. Vol. 90. Pt. 1. pp. 1–11. With 3 text figs. & 8 figs. on 4 plates. [16 refs.]

GREIG (E. D. W.). **Notes on Cases of Calabar Swellings with Radiological Observations.**—*Jl. Trop. Med. & Hyg.* 1940. Jan. 15. Vol. 43. No. 2. pp. 19–21. With 1 fig.

Three *L. loa* infections in missionaries have valuable points of importance.

All had typical symptoms and eosinophilia, and in all the infection was of long standing, in one over 30 years without interfering with work or apparently with general health. In one, radiological examinations were made, apparently for the first time in this infection, with these significant results.

" In the soft tissues external to the right ulna there is a narrow slightly coiled opacity about 2 cm. in length, the appearance of which would be consistent with a calcified or partially calcified filaria (*Loa loa*). It is lying about 5 cm. distal to the elbow-joint. Similar shadows but more coiled are seen on the medial aspect of the left radius and medial aspect of right metacarpal.

" Fig. 1 shows portion of X-ray of right hand. There is a very delicate but definite shadow situated on the medial aspect of right metacarpal, it appears to be slightly coiled. An arrow points towards it. I think there can be little doubt but that this shadow represents a calcified or partially calcified dead adult *Loa loa*." *C. L.*

LINDBERG (K.). Infestation naturelle de *Mesocyclops vermifer* Lindberg par les embryons du ver de médine dans un puits du Deccan (Inde). [**Natural Infection of** *M. vermifer* **by Embryos of** *D. medinensis* **in Deccan Tanks.**]—*Bull. Soc. Path. Exot.* 1939. Oct. 11. Vol. 32. No. 8. pp. 816–821.

Only *Mesocyclops vermifer* Lindberg has been found infected with guinea worm embryos in Deccan tanks.

The numbers of cyclops examined have been : *M. vermifer* 29,587, *M. leuckarti* 26, *Eucyclops* (*Tropocyclops*) *multicolor* 87, *Eu. agiloides* 3, *Microcyclops varicans* 4, *Ectocyclops medius* 1. The numbers of infected cyclops have been 78 from the surface and 30 from the bottom. Of the 78, 4 were females with ovisacs, 66 females without ovisacs, 1 a male and 7 copepods. Of those from the bottom 1 was a female with ovisacs and 29 females without them. The investigation extended over a year, but infection was found only from 4th February to 23rd June, and between 18th February and 3rd April were collected 62 of the 78 infected cyclops got from the surface and 19 of the 30 got from the bottom. Only one embryo was present in any infected cyclops and it was always identified as that of *D. medinensis*. *C. L.*

LINDBERG (K.). Contribution à la question de la présence de poissons cyclopiphages dans les puits du Deccan (Inde). [**Cyclops-Eating Fish in the Tanks of the Deccan.**]—*Bull. Soc. Path. Exot.* 1939. Nov. 8. Vol. 32. No. 9. pp. 880–882.

The writer has noticed in the Deccan, " step-wells " swarming equally with *Mesocyclops vermifer* Lindberg (an intermediate host of *D. medinensis*) and with small fish.

A list of 19 of these fish is given and four of them, *Rasbora daniconius*, *Barbus ticto*, *B. chola* and *Lepidocephalichthys thermalis*, are included in the list of six fish given by MOORTHY and SWEET [this *Bulletin*, 1937, Vol. 34, p. 464] as feeding on cyclops. [Those writers reported that *Barbus* (*Puntius*) *puckelli* was the only species which fully digested the cyclops.] *C. L.*

JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION. 1940. Jan 6. Vol. 114. No. 1. pp. 35–39. [20 refs.]—**Trichinosis and Nonclinical Infections with** *Trichinella spiralis*. Prepared by a Special Committee appointed by R. C. POLLOCK, Chicago, Chairman, Advisory Council on Live Stock and Meat. [Summary appears also in *Bulletin of Hygiene*.]

A valuable summary of the essential facts about trichiniasis, particularly as affecting U.S.A. but containing no new observations. It emphasizes the importance of distinguishing between trichiniasis as a disease and the presence in man of trichinella larvae unaccompanied by apparent illness. From necropsy surveys about 18 per cent. of diaphragms examined contained trichinella larvae. The total number of known clinical cases in U.S.A. from 1842 to 1937 amounts to between

5,000 and 6,000. The symptoms of trichiniasis are dependent to a large extent on the location of the parasite within the host. Control must be along two lines, *viz.*, adequate cooking of all pork and by eliminating the sources of infection of swine. *W. G. Savage.*

ROTH (Hans). **Experimental Studies on the Course of Trichina Infection in Guinea Pigs. III. Immunity of Guinea Pigs to Re-Infection with** *Trichinella spiralis.*—*Amer. Jl. Hyg.* 1939. Sept. Vol. 30. No. 2. Sect. D. pp. 35–64. [25 refs.]

As measured by the numbers of embryos of Trichinella found in test muscles, after a feed to guineapigs of infective larvae, a previous comparatively small infection offers a measure of immunity and that immunity is due to an intestinal defensive mechanism which restricts the numbers of adults that develop there and shortens their lives.

The test muscles examined were masseters, diaphragm, upper parts of the forelegs and the shanks of the hind legs. They were digested and the larvae given to the test animals in food. A dose of 2,000 killed over 90 per cent. of guineapigs. When there had been a previous infection of 400 to 500 the amount of extra infection from 2,000 was insignificant, when the first infection had been by fewer larvae the second one gave higher results but in no case as high as if there had been no earlier infection. A second series of experiments showed, as noted above, that the barrier to muscular infection was in the intestine. *C. L.*

LICHTERMAN (Abraham) & KLEEMAN (Irving). **Detection of Trichinella Infestation in Hogs by the Intradermal Test.**—*Amer. Jl. Public Health.* 1939. Oct. Vol. 29. No. 10. pp. 1098–1102. [14 refs.]

The antigen was obtained by infecting albino rats, freeing the larvae by digesting their muscles, drying and powdering them, extracting the powder with normal saline, and using the fluid after centrifuging. This is the summary :—

" Two hundred and eleven pigs were skin-tested with trichinella antigen. All the pigs had been fed on uncooked garbage. Post-mortem examination of the digested diaphragms was made as a check on the diagnostic accuracy of the skin test. In 4 out of 25 pigs diagnosed as trichinous by skin tests, no evidence of infestation was found at autopsy ; in 1 pig out of 186 diagnosed as non-trichinous, post-mortem examination showed trichinosis. Of 211 pigs skin-tested, 206 were correctly diagnosed as to the presence or absence of trichinous infestation. This is an error of less than 3 per cent. The error, moreover, is in the direction of safety, being more likely now and then to diagnose a normal animal as trichinous, than to pass a trichinous pig as normal." *C. L.*

SWARTZWELDER (J. Clyde). **Clinical** *Trichocephalus trichiurus* **Infection. An Analysis of Eighty-One Cases.**—*Amer. Jl. Trop. Med.* 1939. Sept. Vol. 19. No. 5. pp. 473–481.

An analysis of records of Charity Hospital of Louisiana at New Orleans for the fifteen and a half years period ending July 1st, 1937, revealed 81 cases in which faecal examinations disclosed Trichuris eggs and no other parasites. The technique or techniques used appear to have been unrecorded. The conclusions are :

" A detailed analysis is presented of 81 uncomplicated clinical cases of *Trichocephalus* infection. More than two-thirds of the patients fell within

the age group from six to fifteen years. White patients predominated over colored in the ratio of 5 : 1, and females over males in the ratio 2 : 1. The most frequent symptoms were abdominal or epigastric pain, vomiting, constipation, fever, distention and flatulence, headache, backache, loss of weight, and anorexia. The duration of symptoms in 44 cases was three months or less. Intestinal parasites was the most frequent clinical diagnosis, and chronic appendicitis the next. Physical examination frequently revealed abdominal tenderness without rigidity. In only seven cases was a temperature elevation above 101°F. noted. In about a third of the cases studied from this angle an increase of polymorphonuclear cells was observed. In about a fourth a mild leukocytosis occurred. The average eosinophil count was 4·2 per cent., and the maximum 24 per cent."

*C. L.*

MAPLESTONE (P. A.) & MUKERJI (A. K.). **The Treatment of Trichuris Infection with Iron.**—*Indian Med. Gaz.* 1939. Oct. Vol. 74. No. 10. pp. 607–609.

"It is considered that evidence has been produced that the forms of iron in common use for the treatment of certain types of anaemia are of no use in removing trichuris."

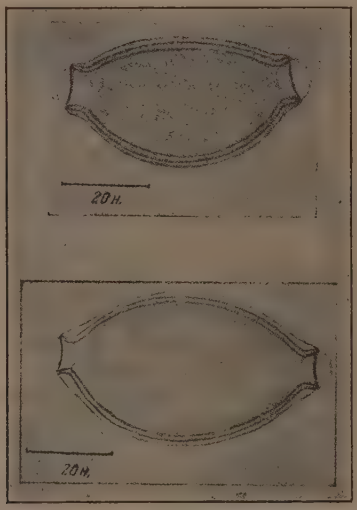
The treatment given was a stock mixture of the Calcutta School of Tropical Medicine and Hospital for Tropical Diseases. The adult dose is :—

| | |
|---|---|
| Iron and ammonium citrate ... ... | 30 grains |
| Glycerine ... ... ... ... | 20 minims |
| Water to ... ... ... ... | 1 ounce |

With this 31 out-patients were treated. After one week 5 were negative of whom 2 were not seen again, 2 were negative and 1 had become positive at the end of the third week. After 2 weeks of treatment 19 returned for examination and 18 were positive. Those returning after 3 weeks of treatment numbered 8 and after 4 weeks 5, and all 13 were still positive. In addition 17 in-patients who were being treated for hookworm anaemia with iron passed Trichuris eggs throughout the treatment and afterwards. As to out-patients it is unlikely that they would have returned for more than the week's dosage, had they not taken it. Presumably VAZQUEZ PAUSA, whose method was being checked [this *Bulletin*, 1938, Vol. 35, p. 380], used the same diagnostic method before and after treatment, so that his two results would be comparable ; but as to actual infection rates Maplestone and Mukerji compare infection figures obtained previously when examining faeces from 3 districts got by D.C.F. and by a Stoll's technique modified by using twice as much diluent as he advises, because they had found that the more dilute preparations give higher egg counts. Of 6,747 stools examined, 5,548 were positive. In the district where the egg count averaged 1,031 per gram. the Stoll technique missed 26·34 per cent. of those whom D.C.F. showed to be infected ; in that where the average egg count was 320 the Stoll technique missed 51·81 per cent. of infected ; and where the count averaged 232 it missed 61·19 per cent. As an exception, in the second district the Stoll technique recorded as positive 0·77 per cent. of cases in which no eggs were found by D.C.F. *C. L.*

SKRJABIN (K. I.). [**Pulmonary Thominxosis: a New Helminthic Infection of Man.**]—*Med. Parasit. & Parasitic Dis.* Moscow. 1939. Vol. 8. No. 4. [In Russian pp. 3–8. With 4 figs. on 1 plate.]

*Thominx aerophilus* (Creplin, 1839) is a nematode of the family Trichocephalidae usually found in the trachea, lungs and nasal cavity of carnivorous animals (cats, dogs, wolves, foxes and some Mustelidae) in Europe and in U.S.A. The author reports its occurrence as a facultative parasite in a patient of a Moscow hospital suffering from a severe form of tracheo-bronchitis. Eggs of this nematode were present in freshly expectorated sputum, while the faeces of the patient contained, in addition to these, the eggs of *Trichuris trichiura*. It would appear that the presence of *Thominx aerophilus* produced characteristic clinical symptoms, a description of which—by the physician in charge of the case—will be published later. A detailed description is given of the parasite and its egg (illustrated by a plate of figures), together with an account of its life-cycle in the obligatory hosts and a discussion of its systematics and nomenclature.




Eggs of *Thominx aerophilus* viewed from different positions.
[Reproduced from *Medical Parasitology and Parasitic Diseases*, Moscow.]

*C. A. Hoare.*

BOLETIN SANITARIO. Buenos Aires. 1939. Sept. Vol. 3. No. 9. pp. 584–622. With 3 charts & 1 map.—Indice de coprologia verminosa en el departamento de Garay. Resultados obtenidos por la Comisión Sanitaria enviada por la Dirección General de Higiene. [**Helminthological Findings in Stool Examinations in Garay.**] [CHAVES GOYENECHEA (Alejandro)].

BOURROUL (Celestino). Tratamento das verminoses. [**Treatment of Helminthiasis.**]—*Bol. Oficina Sanitaria Panamericana.* 1940. May. Vol. 19. No. 5. pp. 441–447.

# MALARIA.

## *Précis* of Abstracts in this Section.

Genevray *et al.* (p. 664) have made a large scale survey of Hanoi, where malaria is only feebly endemic. Eight species of Anopheles were found but there was no important malaria vector. Carr *et al.* (p. 664) describe a malaria survey in a province of Cuba in which the endemicity is low and epidemics occur occasionally. In Italian East Africa Corradetti (p. 665) found, in the Italian population, that malaria was intensely endemic in those places below 1,000 metres where *A. gambiae* breeding is constant. Between 1,000 and 2,000 metres malaria appears with the breeding of *A. gambiae* during the rains, but above 2,000 metres no locally contracted malaria was found.

Shute (p. 666) has observed that in the stomach of *A. maculipennis* blood is agglutinated and serum separated from the clot. The position assumed by the mosquito after feeding determines the position of the clot in the stomach and this in turn determines the position of the oöcysts subsequently found. Boyd (p. 666) from a study of incubated *A. quadrimaculatus* which have been given an infective feed concludes that the incidence of infection detected by stomach and by gland examination is substantially the same and that infection does not influence mortality.

Venhuis (p. 667) describes a new variety of Anopheles, which he provisionally names *A. hyrcanus X*, in the Dutch East Indies. It was found to be a very potent vector of malaria in one district of Celebes and another of Java.

Working with *P. ovale* Sinton (p. 667) found that immunity following infection induced by sporozoites was more effective than that following infection induced by trophozoites. The immunity developed after both methods is probably mainly against trophozoites and not against sporozoites as such [see Wolfson and Causey below].

Sasportas (p. 667) reports malaria in an infant aged two months in Paris and discusses the possible origin. Wickramasuriya (p. 668) discusses malaria and pregnancy and points out that quinine in therapeutic doses is not harmful.

Wijerama (p. 668) treated patients with totaquina or with quinine bisulphate and obtained better results with the former in all forms of infection.

In Panama Clark *et al.* (p. 668) note that epidemic conditions occurred at the end of 1938 in spite of the fact that all parasite carriers discovered each month had for several years been treated with atebrin or quinine, followed by plasmoquine. Anti-mosquito measures are too costly to be practicable. *P. falciparum* is the commonest parasite.

*Malaria of monkeys and birds.*—Rodhain (p. 669) has shown that *P. reichenowi* of apes is distinct from the human *P. falciparum*, and that *P. schwetzi* is probably distinct from the human *P. vivax*. Neither of these parasites of apes is virulent for man. He (p. 670) succeeded in producing infection in man by injecting *P. rodhaini*, which closely resembles *P. malariae*.

Coggeshall (p. 670) found *P. knowlesi* and *P. inui* alive after being kept for 70 days at −76°C. He (p. 670) found that sulphanilamide eradicates *P. knowlesi* infection of monkeys but does not affect *P. inui*. He also shows that the drug almost completely inhibits the consumption of oxygen by *P. knowlesi* but has no such effect on *P. inui*.

KIKUTH and MUDROW (p. 671), as a result of studies on canaries inoculated intramuscularly with sporozoites of *P. cathemerium*, state that the sporozoites enter endothelial cells and become exoerythrocytic schizonts, the merozoites of which may infect other endothelial cells or red blood corpuscles. MISSIROLI (p. 671) gives the results of his investigations on the development of sporozoites inoculated under the skin of canaries. UNGO-MUGDAN (p. 672) found exoerythrocytic schizonts in fowls infected with sporozoites of *P. gallinaceum*, at the time when pigmented parasites first appeared in the blood, but not in those infected by blood inoculation.

WOLFSON and CAUSEY (p. 672) show that canaries which have recovered from a *P. cathemerium* infection induced by blood inoculation are immune to both trophozoite and sporozoite inoculations. [Compare SINTON above.]

MISSIROLI (p. 672) has noted a daily periodicity in the number of gametocytes of *P. praecox* in the blood of birds. *C. W.*

GENEVRAY (J.), TOUMANOFF (C.) & TRY (H. T.). Résultats d'une enquête sur le paludisme à Hanoi. [**Results of an Inquiry into Malaria in Hanoi.**]—*Rev. Méd. Française d'Extrême-Orient.* 1939. Oct. No. 8. pp. 963–974. With 1 map. [15 refs.]

Except for some outlying districts Hanoi has generally been considered to be free from endemic malaria. Sporadic cases of locally acquired malaria have, however, been reported from time to time. The authors of the present report give the results of the first large scale epidemiological and entomological inquiry that has been carried out. The observations were made during the winter monsoon and the summer monsoon: 5,505 children from 2 to 12 years of age were examined, which is about a fifth of the total population of this age in the city. For Hanoi as a whole the spleen index was 0·07, the parasite index 0·44 and the gamete index 0·26 per cent. The central part of the town is completely free from malaria: the only endemic centres are at the periphery, notably on the Sand Bank of the Red River. Even in the latter area the spleen index was only 0·34, the parasite index 1·52 and the gamete index 0·76 per cent., figures which indicate very feeble endemicity.

Eight species of Anopheles were found, *A. barbirostris*, *A. sinensis*, *A. vagus*, *A. philippinensis*, *A. fuliginosus*, *A. aconitus*, *A. tesselatus* and *A. kochi*. *A. vagus* formed 77·89 per cent. of the total, and *A. sinensis* 20·49 per cent. No important malaria vector was found. On the *Banc de Sable* conditions are favourable for an enormous proliferation of these normally harmless species; the region is liable to flooding; when the floods subside extensive marshes are left. The population is poor and lives in insanitary conditions. There is constant communication with areas in which malaria is highly endemic.

*Norman White.*

CARR (Henry P.), MELÉNDEZ (Joaquín Fernández) & ROS (Alberto). **Malaria Reconnaissance of the Province of Oriente in Cuba.**—*Amer. Jl. Trop. Med.* 1940. Jan. Vol. 20. No. 1. pp. 81–97. With 1 chart.

Oriente is the easternmost of the six provinces of Cuba; it is also the most mountainous. A malaria survey of the whole island is in progress; this of Oriente is the first to be reported.

The mountains of Oriente are of no great height; there is no high plateau and there are but few dwellings above 1,000 feet. Such endemic malaria as there is is almost confined to places below 1,000 feet and is most prevalent in the Cauto River valley. During the survey 22,203 children in schools in all parts of the Province were examined for splenomegaly, and the blood of 9,783 children for malaria parasites. The total population of the Province is 1,109,233. The spleen rates for white and negro children were 10 and 6·6 per cent., respectively, and the parasite rates 1·2 and 1·6 per cent. Of the 1,825 enlarged spleens 1,623 were palpable only on deep inspiration. Malaria parasites were more frequently found in children with enlarged spleens than in the remainder; the splenomegaly is thus probably due to malaria. Malaria endemicity is low but occasional epidemics occur; 1934 was the last epidemic year. Of the positive blood films 77 contained *P. falciparum* and 60 *P. vivax*. *P. malariae* was not found. Five species of Anopheles were found, *A. albimanus*, *A. crucians*, *A. grabhami*, *A. vestitipennis* and *A. atropus*. *A. albimanus* was far and away the most prevalent and is almost certainly the important vector in Oriente.

*N. W.*

CORRADETTI (Augusto). L'epidemiologia della malaria nella regione Uollo Jeggiu (Africa Orientale Italiana). [**Epidemiology of Malaria in the Uollo Jeggiu Region, Italian East Africa.**]—*Riv. di Malariologia*. Sez. I. 1940. Vol. 19. No. 1. pp. 39–64. With 8 figs. (1 map) & 4 plates. English summary.

This report gives the results of 20 months' observations in the Uollo Jeggiu region. The observations were confined to the Italian population, for the most part working on road construction, thus eliminating complicating factors arising from immunity consequent upon previous infection, factors which are inseparable from a study of malaria in the indigenous population. Doctors in all parts of the large area sent thick film preparations of all suspected malaria cases to the laboratory at Dessie. To this material was added preparations from the hospital at Dessie. *P. falciparum* infections formed 52·2 per cent., *P. vivax* 44·9, and mixed infections 2·8 per cent. of the total positive findings. Below 1,000 metres intense *A. gambiae* breeding and severe endemic malaria characterize the neighbourhood of permanent collections of water, throughout the year: during the rainy season *A. gambiae* is found everywhere at this altitude and epidemic malaria occurs. Between 1,000 and 1,500 metres *A. gambiae* are few and localized during the dry season and malaria cases are exceptional; with the onset of the rains intense *A. gambiae* breeding begins and is followed by epidemic manifestations of malaria. Between 1,500 and 1,900 metres no malaria occurred during the dry season; the disease appeared during the rains. Above 2,000 metres no case of locally contracted malaria was observed. *A. gambiae* is much the most important vector; *A. pharoensis* may transmit the disease. Other species of Anopheles found were *christyi*, *cinereus*, *coustani*, *demeilloni*, *dthali*, *garnhami*, *macmahoni*, *marshalli*, *pretoriensis*, *rhodesiensis* var. *dthalisimilis*, and *squamosus*. *N. W.*

DE MEILLON (B.) & LEESON (H. S.). **Notes on Ethiopian Anophelini.**—*Bull. Entom. Res.* 1940. Apr. Vol. 31. Pt. 1. pp. 61–67. With 5 figs.

LEESON (H. S.). **On the Wing Forms of** *Anopheles funestus*, **Giles.**—*Bull. Entom. Res.* 1940. Apr. Vol. 31. Pt. 1. pp. 57–58.

SHUTE (P. G.). **The Position of Human Malaria Oocysts on the Stomach of** *Anopheles maculipennis.*—*Arch. Roumaines Path. Expérim. et Microbiol.* Paris. 1938. Sept. Vol. 11. No. 3. pp. 351–354. With 3 folding plates.

The author has previously described the action of the salivary gland secretion of *A. maculipennis* on blood: within a few seconds after the ingestion of blood by this mosquito agglutination of the blood occurs. The anterior end of the mid-gut is swollen with clear blood serum and the agglutinated red cells collect at the posterior end. This probably explains the fact that malaria oöcysts are more numerous at the posterior end of the stomach of infected *A. maculipennis.* As this insect generally rests with its head directed upwards gravity may explain the accumulation of the red cells at the posterior end of the stomach and the consequent distribution of oöcysts.

To test this theory the author devised the following experiment. Mosquitoes after feeding on a suitable host were placed each in a piece of narrow glass tubing about an inch long plugged with cotton wool at each end, sufficiently tightly to prevent the insect from turning. The tube was then placed so that the mosquito was standing on its head: it was kept in this position for 48 hours to allow oökinetes to penetrate. Only about 20 per cent. of mosquitoes survived this ordeal. After 48 hours the survivors were treated as ordinary infected mosquitoes, and dissected on the 8th day. (It is possible to place the mosquito in the inverted position within a few seconds of its completing its feed.) Excellent illustrations show that the above treatment resulted in the oöcysts being much more numerous in the anterior portion of the stomach than is normally the case.

Similar results were not obtained with *Aëdes aegypti* infected with *P. gallinaceum*; the salivary gland secretion of *A. aegypti* does not agglutinate blood. *N. W.*

BOYD (Mark F.). **On the Correlation between the Incidence of Stomach and Gland Infection in** *Anopheles quadrimaculatus* **infected with** *Plasmodium vivax.*—*Amer. Jl. Trop. Med.* 1940. Jan. Vol. 20. No. 1. pp. 129–131.

When lots of *A. quadrimaculatus* infected by a single infecting feed are being incubated the author makes a habit of examining at least 10 per cent. of the lot while the parasite is still in the oöcyst stage. Those examined include nearly all dying a natural death. In the observations recorded both wild and insectary-bred *A. quadrimaculatus* were infected with various strains of *P. vivax.* The salivary glands of all mosquitoes used for inoculation are examined. If large numbers of mosquitoes be examined the incidence of infection, as revealed by stomach and gland dissection, respectively, is in substantial agreement. There was no significant difference between the infection rates of mosquitoes that died a natural death and of those that were killed; it is unlikely that the mortality among mosquitoes undergoing incubation is caused by malaria infection. *N. W.*

VENHUIS (W. G.). **The Hyrcanus Problem in the Netherlands East Indies, with Description of a Wide Spread Malaria-carrying Variety**: *An. hyrcanus X.* (**First Communication.**)—*Meded. Dienst d. Volksgezondheid in Nederl.-Indië.* 1939. Vol. 28. No. 4. pp. 376–390. With 5 figs. [22 refs.] Also in *Geneesk. Tijdschr. v. Nederl.-Indië.* 1940. Jan. 2. Vol. 80. No. 1. pp. 27–43. With 5 figs. on 3 plates. [23 refs.] [In Dutch.]

An examination of pupal pelts of *A. hyrcanus* in Java revealed marked differences from the pupal pelts of both *A. hyrcanus sinensis* and *A. hyrcanus nigerrimus*. Subsequent examination showed that nearly all the *A. hyrcanus* of Java and the Celebes belong to this new variety for which the author proposes the provisional name *A. hyrcanus X*. The deck of the egg of this new variety is narrow. The larva is characterized by sutural hairs with 12–23 branches; the antenna is swollen, clear and transparent, or dark brown in the basal half. The hair B on segment III of the pupa has 48–80 branches as contrasted with 8–38 in *A. h. sinensis* and *A. h. nigerrimus*. In the adult the dark spot on the middle of vein 6 is shorter than the apical spot. At Benteng in the Celebes 54 of 524 *A. hyrcanus X* were found infected. In Karangbinangoen, Java, 46 of 466 specimens of this variety were infected. *A. hyrcanus X* is thus a very potent vector of malaria.

*N. W.*

SINTON (J. A.). **Studies of Infections with** *Plasmodium ovale*. **IV.—The Efficacy and Nature of the Immunity acquired as a Result of Infections induced by Sporozoite Inoculations as compared with those by Trophozoite Injections.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1940. Jan. 29. Vol. 33. No. 4. pp. 439–446.

This is a study of the results of the reinoculation with *P. ovale* of patients who had previously been infected, at varying intervals of time, with either homologous or heterologous strains of that parasite. Primary infections were sometimes induced by sporozoites, sometimes by trophozoites. Reinoculations were sometimes made with sporozoites, sometimes with trophozoites. The study is based on 40 cases. It appears that the immunity which follows infection induced by sporozoites is more effective than that following infection induced by trophozoites. The author has previously shown that parasites derived directly from sporozoites are more aggressive than those resulting from trophozoite injections; the resulting clinical reaction is more severe. This probably indicates more intensive antigenic stimulation of the host. The immunity developed after both methods of infection is probably mainly, if not entirely, operative against trophozoites, and not against sporozoites as such. [See also SCHILLING, this *Bulletin*, 1940, Vol. 37, p. 366.]

*N. W.*

SASPORTAS (L.). Le paludisme chez le nourrisson. [**Malaria in Infants.**]—*Rev. du Paludisme et de Méd. Trop.* Paris. 1940. Feb. 15. Vol. 1. No. 8. pp. 33–44. [18 refs.]

An infant born in Paris began to have febrile attacks when he was two months old. Two months later a diagnosis of malaria was made; numerous parasites were found in the blood, species not stated. The possible sources of infection are discussed at length. The infant lived

with his parents in the Barracks of the Gardes Républicains in the Place de la République in Paris. The infant had received injections of maternal blood before the diagnosis was made but not before the onset of febrile attacks. The mother was a Corsican but she had lived in Paris for 9 years. The father served in Morocco 12 years previously. Neither gave any history of malaria and neither showed any evidence of infection.

The author discusses malaria in infants, both congenital and acquired, and deals at some length with the literature of the subject. [References to congenital malaria in this *Bulletin* in recent years are :—1929, Vol. 26, pp. 11, 387, 412 ; 1930, Vol. 27, p. 662 ; 1932, Vol. 29, pp. 350, 697, 703 ; 1933, Vol. 30, pp. 474, 475 ; 1934, Vol. 31, pp. 419, 427, 689 ; 1935, Vol. 32, pp. 125, 126, 408, 838 ; 1936, Vol. 33, pp. 225, 229, 264, 783 ; 1939, Vol. 36, pp. 392, 393, 492, 783, 1,006.]

*N. W.*

WICKRAMASURIYA (G. A. W.). **The Interactions of Malaria and Pregnancy.**—*Jl. Ceylon Branch Brit. Med. Assoc.* 1939. Nov. Vol. 36. No. 6. pp. 417–440.

The importance and gravity of malaria as a complication of pregnancy are dealt with at length. All the medical and obstetrical complications that may arise from the association are preventable by appropriate anti-malaria therapy. The interruption of pregnancy and foetal death that may occur are both due to malaria, and not to quinine or other drug used in the treatment of that disease. Quinine in therapeutic doses is not an oxytocic. The author urges the generous use of quinine in the treatment of malaria complicating pregnancy. Larger initial doses of quinine than those normally given are often required ; these should be combined with bromides. *N. W.*

WIJERAMA (E. M.). **Totaquina in the Treatment of Malaria.**—*Jl. Ceylon Branch Brit. Med. Assoc.* 1939. Nov. Vol. 36. No. 6. pp. 403–406.

Ninety-five febrile malaria patients, with schizonts in the blood, were treated with totaquina, and 132 similar patients with quinine bisulphate. In one series each patient received 15 grains of one or other drug a day for five days. In a second series the daily dose of both drugs was 20 grains. There were 127 *P. falciparum* infections, 59 *P. vivax* and 10 *P. malariae* : 31 were mixed infections. The author finds that totaquina is more effective than quinine bisulphate in similar doses in stabilizing temperature, in causing the disappearance of parasites from the peripheral blood and in inhibiting the formation of gametocytes, in all forms of infection. *N. W.*

CLARK (H. C.), KOMP (W. H. W.) & JOBBINS (D. M.). **A Ninth Year's Observations on Malaria in Panama, with Reference to the Occurrence of an Epidemic following Continued Treatment with Atabrine and Plasmochin.**—*Amer. Jl. Trop. Med.* 1940. Jan. Vol. 20. No. 1. pp. 47–67.

The observations recorded relate to the year September 1938 to August 1939 ; they are a continuation of the work of the previous year [this *Bulletin* 1939, Vol. 36, p. 819]. Their aim is to determine

the feasibility of control of malaria by drug treatment alone in an area in which anti-mosquito measures are too costly to be practicable. The year was an exceptionally dry one ; there was consequently a diminished flow in the Chagres River with resulting backwater conditions very favourable to anopheline breeding. As before, monthly surveys were made of the populations concerned ; all parasite carriers thus revealed were treated in one group with atebrin followed by plasmoquine, and in a second group with quinine sulphate followed by plasmoquine. Malaria incidence was low till the closing months of the year when epidemic conditions appeared in spite of the continuous treatment of all detected carriers that has been carried out through several years. The incidence of the three species of parasite throughout the year was *P. falciparum* 69·9, *P. vivax* 19·0 and *P. malariae* 11·1 per cent. The parasite rate of infants less than a year old was only 1·5 per cent. Up to July there was very little active malaria ; thereafter parasite rates rose two or threefold with a marked increase of new infections and of heavy infections. In one place there was a close correlation between the number of Anopheles caught in houses and the number of infections. In another village malaria was very prevalent although but few Anopheles could be found. The year's cumulative incidence of malaria for the whole area was 26·1 per cent. ; the highest incidence was in the age-group 10 to 20. *N. W.*

GOUGET (R.). La campagne antipaludique de 1938 dans le département d'Oran. [**The Malaria Campaign of 1938 in Oran.**]—*Arch. Inst. Pasteur d'Algérie.* 1939. Dec. Vol. 17. No. 4. pp. 578–584.

RODHAIN (J.). Les plasmodiums des anthropoïdes de l'Afrique centrale et leurs relations avec les plasmodiums humains. [**Relationship of Malarial Parasites of Anthropoid Apes of Central Africa to those of Man.**]—*Ann. Soc. Belge de Méd. Trop.* 1939. Dec. 31. Vol. 19. No. 4. pp. 563–572.

During the past two or three years the author has carried out experiments arranged to throw light on the relationship between the malarial parasites which occur naturally in chimpanzees and those of man. By inoculating human beings with infected chimpanzee blood and chimpanzees with the human parasites it has been possible to arrive at certain conclusions which were controlled by inoculating blood from the inoculated chimpanzees or man back again to other men or chimpanzees, with a view to determining whether latent or inapparent infections unassociated with the appearance of parasites in the blood had occurred.

It has been found that *P. reichenowi* is distinct from the human *P. falciparum* and differs from it as regards the forms which develop in cultures, while it is quite without virulence for man. The chimpanzee, moreover, is entirely refractory to *P. falciparum.*

The chimpanzee parasite *P. schwetzi* is without virulence for human beings and is probably distinct from *P. vivax,* which it resembles morphologically. The human *P. vivax* inoculated to chimpanzees remains as an inapparent infection for several weeks (26 days), as proved by the inoculation of blood back to human beings. It seems clear that the positive result obtained by MESNIL and ROUBAUD (1920), in which an apparent *P. vivax* infection of 9 days' duration was produced in a chimpanzee, may have been due to the lighting up of a

latent *P. schwetzi* infection, particularly as at the time of this experiment little was known about the natural malarial parasites of chimpanzees.

Two attempts to infect chimpanzees with the human quartan parasite failed, but the reverse experiment of inoculating the quartan-like parasite of chimpanzees to man has not been carried out, as the author has not had available a strain of this parasite. [See also this *Bulletin*, 1938, Vol. 35, p. 816; 1939, Vol. 36, p. 928; 1940, Vol. 37, pp. 61, 367.] *C. M. Wenyon.*

RODHAIN (J.). Les plasmodiums des anthropoides de l'Afrique centrale et leurs relations avec les plasmodiums humains. Réceptivité de l'homme au *Plasmodium malariae* (*Plasmodium rodhaini* Brumpt) du chimpanzé. [**Relationship of Plasmodia of Monkey and Man. Receptivity of Man to *P. rodhaini* of the Chimpanzee.**]—*C. R. Soc. Biol.* 1940. Vol. 133. No. 2. pp. 276–277.

Of the three malarial parasites of chimpanzees the one which resembles the human *Plasmodium malariae* was named *P. rodhaini* by Brumpt. In the present paper the author records an experiment in which the blood of a chimpanzee harbouring this parasite was inoculated to a human being suffering from general paralysis. Forty days later an attack of fever occurred when malarial parasites like the inoculated organisms were found in the blood films. The close resemblance of the parasites to *P. malariae* of man leaves still open the question of its identity. *C. M. W.*

COGGESHALL (L. T.). **Preservation of Viable Malaria Parasites in the Frozen State.**—*Proc. Soc. Experim. Biol. & Med.* 1939. Nov. Vol. 42. No. 2. pp. 499–501.

The paper describes a method for rapidly freezing monkey blood containing either *Plasmodium knowlesi* or *P. inui* and keeping it subsequently at a temperature of —76°C. It was shown by inoculation into monkeys after rapid thawing that parasites were still alive after 70 days' maintenance in the frozen state. *C. M. W.*

COGGESHALL (L. T.). **The Selective Action of Sulfanilamide on the Parasites of Experimental Malaria in Monkeys *in vivo* and *in vitro*.**—*Jl. Experim. Med.* 1940. Jan. 1. Vol. 71. No. 1. pp. 13–20. With 1 fig. & 1 plate.

It has been found that in a monkey infected with *Plasmodium knowlesi* and *P. inui* the administration of sulphanilamide in 1 gram doses by the mouth resulted in the eradication of the virulent *P. knowlesi* infection, leaving the *P. inui* as a milder chronic infection. Investigating the metabolic activity of the two parasites according to the methods of CHRISTOPHERS and FULTON it was found that *P. knowlesi* consumed about six times as much oxygen as *P. inui* and that the addition of sulphanilamide in a concentration less than that required to bring about a cure of the *P. knowlesi* infection almost completely inhibited the consumption of oxygen of *P. knowlesi* in vitro but had no effect on the respiration of *P. inui*. *C. M. W.*

KIKUTH (Walter) & MUDROW (Lilly). Die Entwicklung der Sporozoiten von *Plasmodium cathemerium* im Kanarienvogel. [**Development of Sporozoites of** *P. cathemerium* **in Canaries.**]—*Zent. f. Bakt.* I. Abt. Orig. 1939. Dec. 4. Vol. 145. No. 2. pp. 81–88. With 15 figs. (8 coloured) on 2 plates. [15 refs.]

Working with *Plasmodium cathemerium* the authors have studied the development of sporozoites injected into the pectoral muscles of canaries. They have shown that the inoculation site contains forms which are infective to canaries before the peripheral blood has become infective. Preparations of the inoculation site excised 16, 40, 48 and 64 hours after the injection of sporozoites show intracellular bodies, first with one nucleus and later with many, which undoubtedly represent the sporozoite development in large mononuclear cells. At the end of the period the bodies represent exoerythrocytic schizonts and it is at this stage that the first erythrocytic parasites appear. That a further infection of mononuclear cells can occur is shown by the late finding in preparations of the spleen of uninucleate forms like those seen early at the inoculation site. According to the authors therefore the sporozoite first enters an endothelial cell and becomes an exoerythrocytic schizont the merozoites from which may infect other endothelial cells or red blood corpuscles. The stages of development are depicted in an excellent coloured plate. *C. M. W.*

KIKUTH (Walter) & MUDROW (Lilly). Die Umwandlung der Sporozoiten in die endotheliale Phase der Malariaparasiten. [**Development of Sporozoites into the Endothelial Phase of Malaria Parasites.**]—*Riv. di Malariologia.* Sez. I. 1940. Vol. 19. No. 1. pp. 1–15. With 7 coloured figs. on 1 plate. [20 refs.]

This paper, illustrated by a coloured plate, is a description of the development of sporozoites, injected intramuscularly into birds, within endothelial cells at the site of inoculation. The work is the subject of the paper reviewed above. *C. M. W.*

MISSIROLI (A.). Sullo sviluppo dei parassiti malarici. [**Development of Malarial Parasites.**]—*Riv. di Parassit.* Rome. 1939. Dec. Vol. 3. No. 4. pp. 339–342. With 2 plates. English summary.

The author has continued his researches on the fate of malarial sporozoites inoculated under the skin of canaries. If the sporozoites are advanced in development as indicated by the nuclear chromatin having divided into four or more distinct masses the subsequent development may take place at the site of inoculation. If, however, the sporozoites are less advanced in development, the nucleus having only one or two chromatin masses, the development can be followed in the spleen, to which they have migrated. In either case the sporozoite, perhaps by the loss of some cytoplasm, becomes an ovoid body in which four chromatin masses develop. Finally, division into four small units, each about the size of a merozoite, takes place. The whole of this development occurs extra-cellularly and the interval between the time of involution and the production of the final units varies according to the degree of development of the sporozoites inoculated. It is supposed that these final units invade either red blood corpuscles to become pigmented parasites or cells of the reticulo-endothelial system

to become non-pigmented exoerythrocytic schizonts. The various stages described are illustrated in a series of microphotographs. [See also this *Bulletin*, 1938, Vol. 35, pp. 104, 569.] *C. M. W.*

UNGO-MUGDAN (Armida). Sul comportamento degli stadi exoeritrocitici del *Plasmodium gallinaceum* nelle infezioni con sporozoiti e con sangue. [**Behaviour of Exoerythrocytic Stages of** *P. gallinaceum* **in Infections induced with Sporozoites and with Blood.**]—*Riv. di Parassit.* Rome. 1939. Dec. Vol. 3. No. 4. pp. 329–333. English summary.

Fowls infected with *Plasmodium gallinaceum* by means of sporozoites were killed on the day on which pigmented parasites first appeared in the blood. It was found that 50 per cent. of the birds revealed exoerythrocytic schizonts. The number showing these forms had increased to 71 per cent. on the day following. No exoerythrocytic schizonts were seen on these days in birds infected by blood inoculations. This difference is attributed to differences in the incubation period and virulence of the parasites inoculated by the two methods.

*C. M. W.*

WOLFSON (Fruma) & CAUSEY (Ottis R.). **Immunity to Superinfection with Sporozoites in Two Strains of** *Plasmodium cathemerium*. [Research Notes.]—*Jl. Parasitology.* 1939. Dec. Vol. 25. No. 6. pp. 510–511.

It has been claimed by BOYD and KITCHEN [this *Bulletin*, 1937, Vol. 34, p. 72] that human beings, after recovery from *P. vivax* infections, whether induced by inoculation of blood or injection of sporozoites, are immune to further injections of trophozoites but not to injections of sporozoites. In the present paper the authors show that canaries which have recovered from a *P. cathemerium* infection induced by blood inoculation are immune to both trophozoite and sporozoite inoculations. *C. M. W.*

MISSIROLI (A.). Modificazioni periodiche del numero di gametociti di *Plasmodium praecox*. [**Periodic Modifications in the Number of Gametocytes of** *P. praecox*.]—*Riv. di Parassit.* Rome. 1939. Dec. Vol. 3. No. 4. pp. 279–285. With 7 charts. English summary (7 lines).

By feeding mosquitoes on birds infected with *Plasmodium praecox* at different times during the night and noting the number of oöcysts which developed in these mosquitoes it has been shown that the number of gametocytes capable of developing in mosquitoes increases during the early hours of the morning and that a decrease occurs during the following four to six hours. *C. M. W.*

## MISCELLANEOUS.

SCHRETZENMAYR (A.). Erfahrungen ueber Kriegsseuchen im chinesisch-japanischen Konflikt. [**Experiences in the Chinese-Japanese War.**]—*Muench. Med. Woch.* 1939. Dec. 1. Vol. 86. No. 48. pp. 1687–1689.

The author worked in the clinic of the military academy of medicine at Canton before and for 1½ years after the commencement of hostilities and has therefore had the opportunity of seeing under wartime conditions the diseases he discusses. Malaria, especially subtertian malaria, was the most frequent disease seen, and cerebral forms were common, especially in the small columns of troops operating in the plains. The superiority of atebrin over quinine in treatment was demonstrated [but no figures are given]. Plasmoquine should be given before the patient leaves hospital, chiefly as an aid in the prevention of further spread. Of kala azar nothing new is reported; infection was brought to the south from the highly infected central and northern parts of China. The author writes of the value of X-rays, with Iodipin, in the exploration of liver abscess cavities for drainage. Relapsing fever is present, but a single injection of 0·3 gm. neosalvarsan suffices for cure.

In cholera, treatment should be commenced at once on clinical diagnosis without waiting for bacteriological confirmation, and in milder cases 1 litre, in severe cases 3 litres, of saline should be given intravenously, followed by further intramuscular injections. Anti-cholera vaccination protects for only about 5 months and should be given once each year, before the onset of the cholera season. The author gives a description of purpura variolosa, an acute form of haemorrhagic smallpox, highly infective, which may be seen at the beginning of an epidemic and which may not be recognized. There may or may not be an initial rash, there is widespread cutaneous haemorrhage with swelling of the eyelids and bloody discharge from mouth and nose. This condition is acutely fatal without the development of the characteristic features of smallpox. *C. W.*

WILSON (Gale). **The Cardiopathology of Heatstroke.**—*Jl. Amer. Med. Assoc.* 1940. Feb. 17. Vol. 114. No. 7. pp. 557–558.

The author records four cases of death with hyperpyrexia. One was a man of 45 years, working as a sawyer on a very hot day (92°F. in the woods where he was at work), and exhibiting the symptoms of "heat stroke." When seen he was unconscious, with temperature 105°F., which rose to 107°F. in the axilla before death. Post-mortem there was a haemorrhagic effusion of 150 cc. in each pleural cavity, congestion of the lungs and blood-stained secretion in the bronchi, and, in the heart, a large subendocardial haemorrhage on the septal and posterior walls of the left ventricle. The kidneys showed petechiae.

The other three patients were undergoing pyretotherapy, and, in the cases of two, there had been a short interval between the conclusion of the sitting and the onset of "heat stroke" symptoms; in the other the heat was discontinued because after three hours the patient's temperature was 106°F. Death occurred within 12 hours. All four patients were believed to have been in "good health"

before the attack. At autopsy, one showed congestion and extravasations in the central nervous system, another cerebral oedema and congestion and the third petechiae in the brain ; but common to all was a fairly extensive haemorrhage on the ventricular septum in the region of the bundle of His. *H. H. S.*

COHEN (W.). **On Conditions of Exhaustion as a Result of Summer Heats in the Palestine Plain.**—*Harefuah.* Jerusalem. 1939. Nov.–Dec. Vol. 17. No. 5–6. [In Hebrew pp. 167–175. English summary p. I.]

" 1. Damp heat causes often during the hot summer months in Palestine, particularly during July–September, conditions of weakness and exhaustion.

" 2. There is considerable similarity between these morbid conditions of exhaustion and suprarenal insufficiency.

" 3. Recent experiments on animals indicate that suprarenal insufficiency is caused by disturbances in NaCl, vitamin C and hydrogen metabolism. It seems that these disturbances constitute the main causes of the symptoms observed.

" 4. In the conditions of exhaustion described the disturbance in NaCl and hydrogen metabolism was proved. This disturbance was caused by excessive sweating and drinking a large quantity of fluids not containing NaCl.

" 5. There is no doubt that the loss of NaCl constitutes the main cause of these conditions of exhaustion which affect also the suprarenal gland.

" 6. This serves as an indication that in the treatment of these cases a reserve of NaCl in the body is to be maintained by adding NaCl to the diet and by decreasing the amount of fluids. In severe cases preparations for the therapy of the suprarenal gland may be used in addition to the medical treatment."

WECHSLER (Z.). **Autonomic Dystonia in the Tropics and its Treatment.** —*Jl. Trop. Med. & Hyg.* 1940. Jan. 15. Vol 43. No. 2. pp. 21–24.

This is a study of the so-called tropical neurasthenia which, though usually discussed in too cursory a manner in text-books, is important in that about one-half of the white population of tropical countries exhibit symptoms and a significant proportion require medical treatment. The symptom complex varies greatly and the aetiological factors include climatic conditions, intoxications, infective diseases and constitutional and psychogenic factors. Symptoms include slackness, excessive sweating, tremor, tachycardia, rise of blood pressure, headache, increased basal metabolism, diarrhoea, loss of appetite and oligomenorrhoea. Emotionalism is present and may be pronounced, it may even cause a condition similar to that of incipient thyrotoxicosis.

There are innumerable transition stages and the general picture is one of disturbed visceral and endocrine function as well as of changes in psychic equilibrium, without demonstrable organic change. Sympathicotonia and hyperexcitation of the parasympathetic system are present, though these are rarely sharply defined since the one leads to the other.

The author has attempted to inhibit the autonomic centres in the brain by drug therapy, but since autonomic disturbances often have

their cause in the peripheral organs themselves it seems logical to extend therapy to the use of drugs acting on autonomic nerve endings as well. The compound Bellergal (Sandoz) contains a sympathetic sedative (ergotamine tartrate 0·3 mgm.), a parasympathetic sedative (Bellafoline 0·1 mgm.) and phenobarbitone (20 mgm.) and is useful provided that the individual dosage is determined. In mild cases 1 tablet twice daily suffices, but up to 6 tablets daily may be necessary though the dose given should not produce dryness of the mouth, disturbances of accommodation or excessive sedative action. Usually administration for several weeks is indicated and withdrawal should be gradual. More restful sleep is the first sign of improvement. Physical and dietetic measures should also be employed :—several cold showers daily, a diet rich in vitamins and carbohydrates and poor in proteins. Bromide or chloral may be needed. The results of this treatment have been markedly effective. *C. W.*

REPOND (A.). Une névrose orientale. [**An Oriental Neurosis.**]—*Schweiz. Med. Woch.* 1940. Feb. 17. Vol. 70. No. 7. pp. 148–150.

The author has studied the condition of latah. After giving a general sketch of the symptoms of this curious condition he discusses its possible or probable nature, but does not seem to reach any very satisfying conclusion. Physical examination of nine patients has not revealed any defect ; all seemed to be in excellent general health, nor could he detect any sign of mental disorder, such as, for example, schizophrenia. The general mental state, says the author, was fairly low on an average, but in one instance was higher than the patient's associates and he concludes " One can only say that the intellectual level does not seem to differ materially from that of other natives," and that latah " is the result of the mental make-up (la résultante du fond mental) peculiar to certain Eastern peoples." [This is mere tautology and no explanation.] Latah has been classed with the hysterias : with this the author disagrees, the mentality is not that of the hysteric. The subjects are pained at their condition and fight hard against it. He thinks that it is more of the nature of an obsession or anxiety neurosis. Later, however, he states, " apart from their ectokinetic crises they exhibit no tendency to phobias or obsessions " and " anxiety is not the usual state of these patients," and again " there is no proportionate relation between the external excitant and the intensity and extent of the distress phenomena of latah," but " there exists a certain state of anxious tension readily set free." Finally, " latah is, then, merely a neurosis, the symptoms of which are proportionate to the rudimentary mentality of low class natives." [These statements which have been quoted are difficult to reconcile ; they seem to contradict each other. Moreover, the peculiar limitation of the disease to the Malay race is not explained (see also this *Bulletin*, 1925, Vol. 22, p. 70 ; 1929, Vol. 26, p. 581 and 1936, Vol. 33, p. 73).] *H. H. S.*

NYASALAND PROTECTORATE. ANNUAL MEDICAL & SANITARY REPORT FOR THE YEAR ENDING 31ST DECEMBER, 1938.—[**A Case of Onyalai** pp. 57–58, SHELLEY (Horace M.), Govt. Pathologist.]

The patient was a Nyasaland born native, aged 32 years, repatriated from Southern Rhodesia where he had been working in the mines for

6 years. From May 1938 he had been in Gatooma native hospital, but the nature of his illness is not known. He came to Zomba Hospital on 26th October, 1938, complaining of mild abdominal pain and cough. He was then of poor physique and examination discovered haemorrhagic vesicles on the mucosa of the cheeks and soft palate and beneath the epithelium of the tongue, one was as large as $1 \times \frac{1}{2}$ inch; gums were soft and spongy. Blood counts gave red cells 3,460,000, a few normoblasts and some degree of anisocytosis, white 6,000, platelets 170,000 per cmm., reticulocytes 1·5 per cent.; haemoglobin 65 per cent., C.I. 0·9; a relative lymphocytosis (37 per cent.) at the expense of polymorphonuclears (56 per cent.); bleeding time 9½ minutes or nearly four times the normal and clotting time 4 minutes. Ten cc. of the patient's whole blood were injected intramuscularly. In four days the vesicles disappeared and the general condition improved and the patient left hospital 17 days after admission. This is the first case of onyalai recorded in Nyasaland, but the fact that the man had resided and worked for several years in Southern Rhodesia should be noted [see this *Bulletin*, 1938, Vol. 35, pp. 74, 444; 1939, Vol. 36, pp. 157, 158, 938]. *H. H. S.*

JUNGE (W.). Zur Ätiologie des von Dr. Kröber beschriebenen eigenartigen Krankheitsbildes bei afrikanischen Eigeborenen. [**The Aetiology of the Disease described by Kröber in African Natives.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1939. Sept. Vol. 43. No. 9. pp. 416–418. [Summary appears also in *Bulletin of Hygiene.*]

KRÖBER has described a peculiar disease of the natives of the west shore of Lake Victoria. The disease consists of a fistulous, nodular elephantiasis of the genital region, combined with an ascending inflammation of the urinary passages. He considered gonorrhoea to be the sole cause of this disease. Junge agrees with Kröber as to the importance of gonorrhoea in the aetiology of this type of elephantiasis, but is unable to offer any direct proof of this hypothesis. The disease is seen in the Cape Mount region where bilharziasis is not observed, but not in Balahoun where bilharziasis is extremely common and gonorrhoea rare. He admits, however, to having obtained in a few cases a positive Frei reaction, and in some others *Wuchereria bancrofti* were found. Finally, he describes a patient in whom similar symptoms developed after circumcision, followed by ulceration of the penis, the appearance of an urinary fistula, and finally of an urethral stricture. Therefore, he concludes that every disease which in its course produces an obliteration of the lymphatics of the genital region, could be a cause of "Kröber's disease," though the most frequent cause is gonorrhoea [see this *Bulletin*, 1940, Vol. 37, p. 226].

*H. N. H. Green.*

[Elephantiasis, is, after all, merely a symptom and may be due to several causes. Manson-Bahr's classification is very serviceable; he speaks of: (1) Congenital (Milroy's disease); (2) Parasitic (filarial); (3) Septic, *Elephantiasis nostras*, in lymphatic infection by streptococci; (4) Toxic (*e.g.*, chrysarobin absorption); (5) Obstructive (adenitis: tuberculous, malignant, syphilitic, etc.); (6) Venous secondary to thrombosis (phlegmasia alba dolens).

"Kröber's disease" might come under either Elephantiasis nostras (3), or Obstructive elephantiasis (5). *Ed.*]

MINCHIN (R. L. Haviland). **Primary Lateral Sclerosis of South India. Lathyrism without Lathyrus.**—*Brit. Med. Jl.* 1940. Feb. 17. pp. 253–255. [18 refs.] [Summary appears also in *Bulletin of Hygiene.*]

The author has investigated a series of 21 cases, all but one males, and all between 19 and 45 years of age, with symptoms of spastic paraplegia, with retention of abdominal and cremasteric reflexes and no sensory changes. They seemed clearly to be cases of "primary" lateral sclerosis and, by elimination, the syndrome was seen to be identical with that of lathyrism. *Lathyrus sativa* is, however, not consumed by the inhabitants of South India. The diets in Madras Presidency are deficient in vitamins and proteins; *L. sativa* grains are rich in proteins but deficient in tryptophan and the author concludes that the so-called lathyrism may be due, not to the toxic effect of the Lathyrus seed [though other vetches than *L. sativa* may produce the symptoms] but to the tryptophan deficiency, which may occur even in the absence of this vetch. [If this is confirmed the name lathyrism will have to be restricted to those cases which are due to Lathyrus, or discarded altogether if tryptophan deficiency is the cause. It is puzzling enough to have a *pellagra sine pellagra*, and a *scarlatina sine eruptione*, without the addition of *Lathyrismus sine lathyro.*]

*H. H. S.*

WESTPHAL (Albert). Protozoen der offenen Körperhöhlen des Menschen in experimentellen Abszessen. [**Intestinal and Other Protozoa of Man in Experimental Abscesses.**]—*Zent. f. Bakt.* I. Abt. Orig. 1939. Oct. 9. Vol. 144. No. 7/8. pp. 416–421.

Cultures of intestinal protozoa were inoculated into rats, either intramuscularly or subcutaneously, with a view to observing if, in the event of abscess formation by reason of the bacteria in the culture, the protozoa would develop in the pus or abscess wall. Besides *Entamoeba histolytica*, which developed on one occasion only out of ten, as demonstrated by culture from the abscess wall, the three human trichomonads, *Trichomonas hominis*, *T. vaginalis* and *T. elongata* were the only protozoa which grew in the abscesses with any regularity. Negative results were obtained with *Entamoeba gingivalis*, *Chilomastix mesnili*, *Enteromonas hominis* and *Balantidium coli*. *C. M. W.*

ZEETTI (R.). Le lait-sang comme milieu de culture pour "Trichomonas Mazzanti." [**Blood-Milk as Culture Medium for** *Trichomonas foetus.*]—*Boll. Sezione Ital., Soc. Internaz. di Microbiologia.* Milan. 1939. May–June. Vol. 11. No. 5–6. pp. 129–135. [24 refs.]

The author states that he has been able to cultivate with ease and certainty *Trichomonas foetus* (termed by him *Trichomonas Mazzanti*) in a medium consisting of sterilized cow's milk to which 5 to 10 per cent. of defibrinated blood (presumably cow's blood) has been added.

*C. M. W.*

FISCHER (I. A.). **Hospital Accommodation in the Netherlands Indies.**—*Bull. Colonial Inst. Amsterdam.* 1939. Dec. Vol. 3. No. 1. pp. 24–35.

The author gives interesting figures of the populations and the available hospital beds in the Dutch East Indies. It is pointed out

that in parts of Java and Madura the density of the population is equal to that in Holland itself and that since 1920 the population of the Indies has increased by 23 per cent., and in 1930 totalled over 60 millions. In Java and Madura (population 41¾ millions) there are 227 general hospitals with 20,785 beds; in the Outer Provinces (Sumatra, Borneo, Great East, population 19 millions) there are 432 general hospitals with 28,792 beds. In these general hospitals the ratio between the number of days' treatment given and the maximum number of available bed-days is the same for both groups of colonies, 57–58 per cent., which is the proportion of available beds used. On the other hand the proportion in the case of special hospitals is between 90 and 100 per cent., showing that the accommodation in such hospitals is severely taxed. The proportions of these special hospitals and beds is about the same as that of the general hospitals, *i.e.*, the Outer Provinces are more adequately provided for.

A quotation is given from an account written by Professor E. P. SNIJDERS who visited hospitals and clinics in various parts. He stresses the impression that missionary hospitals are the most intimately in contact with the natives. This is probably " due to the great devotion which, in view of their calling as missionaries, the doctors there expend on their work, and to their talking with the people in *their own tongue* .." Their system approaches the Javanese. The central Petronella Hospital is in touch by telephone with a number of auxiliary hospitals and a travelling clinic goes regularly round the district; Government hospitals can rarely afford an organization as adequate as this.

Agricultural colonies for non-violent native mental patients have been instituted, and the method has been extended to lepers. In this work again missionaries are active. For the control of tuberculosis there are 10 sanatoria and many consultation bureaux, and in 1940 nine more sanatoria are to be added. But this method of combating the disease is regarded as too expensive for the Indies and more attention is to be devoted to the prevention of the great national diseases, malaria, yaws and ankylostomiasis and to the improvement of nutrition and housing, in the hope of influencing the tuberculosis situation. One sanatorium has proved so attractive that patients flocking for treatment cannot be accommodated and an arrangement has been made by which they are taken into the houses of a neighbouring village while undergoing treatment. There was no means of checking this influx and all the Government could do was to guide the activities into the right channel [with, one hopes, adequate safeguards against infection of the villager hosts]. Other villages of this kind will probably develop. *C. W.*

CHOPRA (R. N.) & BADHWAR (R. L.). **Poisonous Plants of India.**—*Indian Jl. Agric. Sci.* 1940. Feb. Vol. 10. Pt. 1. pp. 1–44.

No abstract can do justice to this excellent article. It is a mine of information which should be kept accessible to toxicologists, research workers, and those engaged in tropical medical jurisprudence. The climatic conditions of India are " an epitome of the climates, seasons and soils of the British Empire " and plants with active and medicinal principles grow abundantly. Only a proportion, and not a large proportion, of the 2,000 and more such plants has been investigated, even superficially, and fewer still in detail. In some cases the toxic effects are immediate, in others cumulative; in some the active

principle is an amine or an alkaloid, in others a glucoside, in others again a volatile oil, a toxalbumen or a resin. The plants belong to Cryptogams and Phanerogams, they may be poisonous to man, to livestock, to fish, to insects; they may constitute forms of food poisoning as unintentional or deliberate adulterants, and so forth. In this article, after brief preliminary remarks the authors have tabulated a list of 88 Families, naming their active principles, the names of nearly 400 toxic plants, and a note on each as to the class of poison contained and its mode of action. The whole is an admirable introduction to Indian toxicology and should serve as a sound basis for more detailed research. *H. H. S.*

RAYMOND (W. D.). **Tanganyika Arrow Poisons: A Medico-Legal Problem.**—*East African Med. Jl.* 1939. Mar. Vol. 15. No. 12. pp. 419–431. With 13 text figs. & 7 figs. on 3 plates. [24 refs.]

Regarding the abstract of the article by W. D. Raymond on Tanganyika Arrow Poisons [see this *Bulletin*, 1940, Vol. 37, p. 72] the author has written to point out that the toxicity for man as compared with that for animals is not proportional to their weight but to their body surface and is calculated according to the following formula:—

$$D_M = \left(\frac{M}{A}\right)^{\frac{2}{3}} \times D_A \text{ where } D_A = \text{Dose for animal}$$

$D_M$ = Dose for man
M = Wt. of man
A = Wt. of animal

*H. H. S.*

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## REVIEWS AND NOTICES.

DOMINGUEZ (Francisco) [Ancien Professeur et Doyen de la Faculté de Médecine de la Havane, etc.]. **Docteur Carlos J. Finlay. Son centenaire (1933). Sa découverte (1881).** [Doctor Carlos Finlay and his Work.]—302 pp. With 7 figs. on 5 plates & 1 text fig. 1935. Paris: Librairie Louis Arnette, 2 Rue Casimir Delavigne.

This book was published in 1935 but did not reach the Bureau until June 1940. The author was a personal friend of Dr. Carlos Finlay, and tells us that he spent four years in producing this memoir because he felt the necessity for bringing forward chapter and verse to confirm his statements and to establish once and for all Finlay's position regarding the transmission of yellow fever by the mosquito. Some writers have ascribed the priority of this suggestion to Beauperthuy, but this is certainly incorrect; Nott put forward the idea in 1848, five years before Beauperthuy. Professor Dominguez affirms, first, that Finlay was unaware of Beauperthuy's publications and, second, that according to the latter the mosquitoes were believed to inoculate man with the fever (virus) which they had sucked up from the marshes, whereas Finlay stated that the mosquito was the direct transmitting agent from the sick to the healthy, that the female only acted in this way and then only after being impregnated.

The reviewer agrees with the author—and has in fact expressed the view on more than one occasion—that full justice has not been done to

Finlay, at all events it was tardy and delayed, but in the present work, which is one of special pleading for his friend, the author at times tends to claim too much. Some of these claims will be noted in what follows, but it is not quite correct to say that subsequent events have shown that Finlay was justified in writing that "Anyone who takes the trouble to read my work will be convinced that among the facts and deductions attributed to modern investigators [this was written in 1899] it will be difficult to discover a single one which has not been enunciated, demonstrated, or suggested by me as a result of my personal observations and experiments" (translated from Trabajos selectos, p. 430).

The following, which is quoted more than once, will serve as an instance. A mosquito was allowed to bite a patient on the fifth day of disease (he died on the seventh); three days later this mosquito was put to bite a healthy man. A week later this man fell ill and six days afterwards showed symptoms of benign yellow fever. [If the disease was yellow fever, the patient had probably been infected by another mosquito than the experimental one. This, the author seems to acknowledge later saying: The control was not perfect and an individual inoculated by Finlay with one of his mosquitoes was also liable to be bitten by others heavily infective.] The same instance is referred to in another place, but there the date of infection of the mosquito was 12 days before it bit the second man and it was 14 days after inoculation when the patient had yellow fever and albuminuria. This is claimed as the first case of yellow fever to be produced experimentally by a mosquito bite.

At that time the common belief was that infection was acquired in the air inhaled or in food ingested; the mosquito idea was new and rejected off-hand.

Manson's Filaria work of 1879–83 was not known in the western hemisphere in 1881, therefore, says the author, "to Finlay without doubt belongs the honour of being the first to note and prove the transmission of disease from man to man by the intermediation of a blood-sucking insect." Obviously an invalid argument.

Finlay enunciated, among other propositions, that inoculation of yellow fever by the bites of one or two mosquitoes is a good way of conferring, without risk, immunity against severe forms of disease and of protecting those exposed to infection in epidemic foci. He claims, however, more than he can prove when he asserts that inoculation by a *single bite* is not able to give rise to severe forms of yellow fever. The cases of CARROL and LAZEAR—one nearly fatal, the other causing death on the seventh day of illness—refute this dictum.

Again and again the author girds at the American Commission for ignoring Finlay and citing others who made similar suggestions later. Finlay complains that the members would not listen to him and states that had they done so in 1899 and acted upon his advice an incalculable number of lives would have been saved in Havana. The list of eleven experimental cases of the Americans is contrasted with one of 104 of Finlay's. The former demonstrated: (1) That the mosquito must bite an infected person early in the course of his disease, and (2) That it must have time to develop the virus if a fresh subject is to be infected by it.

We must dwell a little on Finlay's list of inoculated subjects if we are to do justice to the author's work. This list gives many details, but one all-important is omitted, which we refer to later; nevertheless

it does not show the clear-cut results of the Commission's tests; the cases are far from conclusive and in many respects the results are at variance with our present knowledge. A few will be referred to here; the numbers are those in the list.

No. 1. One mosquito bit an infected person on the fourth day of illness and later a healthy subject [the interval is not stated in this or any of the 104 listed]. Fourteen days afterwards the latter developed albuminuria, but no yellow fever.

No. 7. A subject was bitten on 7th August, 1881, by a single mosquito which had fed on a patient on the third day of illness, and on 11th September, by another which had fed on the sixth day of a case which ended fatally. "No pathological effects" followed, but on 10th September, the following year (364 days afterwards), the man developed yellow fever "with jaundice and haemorrhage, but no albuminuria."

No. 15. A subject bitten by one mosquito which had fed on an albuminuric yellow fever patient on the fourth day of disease. "No pathological effects," but the man died of yellow fever 8 months later.

Nos. 19–21. Three subjects each bitten by a single mosquito (but each by a different mosquito) which had fed on a yellow fever patient on the fifth day of illness. One developed yellow fever 355 days after, one three months and the other five months later.

No. 34. The mosquito bit an albuminuric patient on the third day of his attack of yellow fever. No pathological effects followed the subsequent biting of a healthy subject who, however, died of yellow fever 6 years later. Another similar case is reported (No. 68) in which death from yellow fever occurred 5 years later.

No. 83. Lastly, a man was bitten twice by a mosquito which had fed on a yellow fever patient with albuminuria on the third and sixth days of his illness. "No pathological effects" followed, but the man died of yellow fever 22 weeks and 5 days later.

No explanation is given of the term "no pathological effects" following inoculation; the fact is stated in 90 of the 104 recorded. It may be that this is what we now understand as "inapparent disease" and this would seem to be borne out by a later statement (p. 130). Again, though the number of mosquitoes which were allowed to bite is stated and the day of disease of the infected person (which might be as late as the seventh), we can find no mention of the length of interval between the feeding on the infected subject and the biting of the non-infected. Subsequent work of the Commission showed this to be of the utmost importance; but Finlay did not believe in the limitation of infectivity in man to the early days of illness.

Again, as regards period of incubation, Finlay held that in the natural disease, or after inoculation, this ranged between 5 and 21 days; the American Commission established it to be between 41 hours and 5 days 17 hours. The general belief to-day is 4 to 13 days, mostly nearer the lower figure, and, very rarely, less. Finlay in his table gives up to 25 days.

Finlay was clearly right in stating as the basis of prophylaxis three great principles: Isolation of the patient in a mosquito-protected room or ward; fumigation of the infected house; and anti-mosquito measures.

The author asks: Should the work of the American Commission be regarded as one of control or of discovery? The reply, we think, is "both"; its findings in many respects confirm (and so control) the

work of Finlay, but it established new facts regarding the time of infectivity—the first 3 days of illness—the time for development of the virus in the mosquito before its bite is infective, and the period of incubation after infection. All that Finlay stated was " the patient must be at the right period of disease " (une période adequate ; dans une période déterminée), the 3rd, 4th, 5th or 6th day of disease, " not before or after " and " the mosquito is infective from the first day [after biting], becoming progressively more virulently infective." The author states later (p. 160) that this is so if the insect is crushed and inoculated into a monkey and the latter is thereby rendered immune ; he regards this as confirming Finlay's dictum, and he also cites this fact of early infectivity as proof of the bacterial nature of the infecting material.

Reverting to the " twelve day in mosquito " question the author says that " Finlay had already noted this fact but in the goodness of his heart and by reason of religious scruples in the first place not to wound " (*primum non nocere*) he had nevertheless insisted that severe attacks of yellow fever were the result of many bites or of the bite of a mosquito which had fed on persons some days or weeks after being infected, that is, one early bite or few bites bring about a mild attack. Finlay's findings, though showing much insight, certainly had not the exactitude of those of the American Commission.

The reviewer, as mentioned above, is one of those who think that, in the early days of the study of yellow fever, at the end of last century and the beginning of this, due credit was not given to Finlay, but this is far from agreeing with the author whose devotion to Finlay and his memory have led him to the other extreme. According to Professor Dominguez, when Finlay first enunciated his theory he was regarded as a lunatic and people turned their backs on him, and later when the American Commission came round to Finlay's views or to see the correctness of his surmise as to the agency of the mosquito as vector, instead of expressing their agreement they tried to wrest his discovery from him or to belittle him and give the credit elsewhere " with the sole aim of soiling the name of Finlay," and that when writing on yellow fever and its transmission they intentionally disregarded Finlay's claims and that even General Gorgas and Dr. Guiteras believed him to be mad. This is surely the language of hyperbole, for we read elsewhere that Finlay met the members in the friendliest spirit, offered his whole-hearted co-operation and later expressed his admiration for their methods and technique, while, on the other side, Reed wrote : " To Doctor Carlos Finlay must be given full credit for the theory of the propagation of yellow fever by means of the mosquito he proposed in the paper read before the Royal Academy of this town at its session of 14th August, 1881."

The author has taken great trouble to give documentary evidence for his facts, and the book is of outstanding interest to all those who delve into the historical side of tropical medicine. Professor Dominguez clearly regarded his undertaking as a labour of love, and is to be heartily congratulated on its accomplishment. *H. H. S.*

Krikorian (K. S.) [M.D.] & Bedrechi (N.). **Atlas of the Anopheles Mosquitoes of Palestine.**—48 pp. With 35 figs. 1940. Apr. 15. Jerusalem : Department of Health.

This little book is a pictorial record of the Anopheles of Palestine and is intended as a guide for those who have little or no knowledge

of entomology and who wish to identify the Anopheles. Descriptive matter is reduced to a minimum but is adequate for the purpose. The identification of larvae is included. It is illustrated by line drawings and monochrome half-tone plates sufficiently well reproduced and it should be a valuable handbook to those for whom it is intended.

*C. W.*

MACLEOD (J. M. H.) [M.A., M.D., F.R.C.P. (Lond.), etc.] & MUENDE (I.) [M.B., B.S., B.Sc. (Lond.), etc.]. **Practical Handbook of the Pathology of the Skin. An Introduction to the Histology, Pathology, Bacteriology, and Mycology of the Skin with Special Reference to Technique.** 2nd Edition.—pp. xix+415. With 27 coloured and 125 black & white illustrations. 1940. London: H. K. Lewis & Co. Ltd. [42*s*.]

The last edition of this book was published in 1903 and it has been out of print some time. The original author based his work on a series of demonstrations given at Charing Cross Hospital and he has now, in collaboration with Dr. Muende, Pathologist to St. John's Hospital for Skin Diseases, remodelled the book and brought the text fully up-to-date.

There are thirty-seven chapters, but in spite of such a number the dimensions of a handbook have been preserved by cutting out discursive matter and keeping strictly to the point. The quality of paper and format have not been sacrificed in any way, nor have rarer skin conditions been excluded.

The first four chapters give detailed accounts of biopsies and histological methods, and are followed by a chapter each on cell characters and on general architecture and embryology, by two on the structure of the epidermis and four on its pathology. The minute structure, congenital anomalies, degeneration and general pathology of the corium are each given separate chapters, and there are three on its special pathology. Other chapters include one on the hair, one on the sebaceous glands, on the sweat glands, the muscles, the blood vessels, blood diseases and the skin, lymphatics, nerve endings, fat, pigment, and the nails. Parasitic conditions are considered in one chapter and are followed by a chapter on the bacteriology of the skin. The bacteria themselves are dealt with separately and shortly, but the fungi are given thirty-two pages in which methods of demonstration, morphology and cultural characters are carefully described. Animal parasites receive a separate chapter.

It is evident that the authors have set themselves an ambitious task and it is only by exercising great powers of condensation that they have avoided the production of an unwieldy tome. In nearly all its features the book is unique. Techniques are described with enough detail to be of full practical value. There is an abundance of excellent illustrations, frequently in colour, and the writers and their collaborators have been at great pains in their semi-diagrammatic pictures to stress the really important features which they wish to bring out. This is well seen in the plates illustrating Bowen's disease or Paget's disease or molluscum. At the end of most chapters is a useful summary of the conditions discussed.

There are a few minor points which deserve mention. For instance, one is glad to see that the "micro-abscesses" of Munro have been noted in several conditions other than psoriasis, *e.g.*, in eczema and

pityriasis capitis, and that they are generally to be found in the group of parakeratoses. Also dyshidrosis is now admittedly linked up histologically with eczema.

There is not much with which one would quarrel, but the remarks on the capillary resistance test suggest a specificity which is not in accordance with everyday experience; for instance, drug eruptions and other conditions may give a positive result to the test. Further, impetigo neonatorum is stated to be caused by streptococci, though most recent workers find that the lesions are commonly caused by staphylococci, and the controversy on the subject is not mentioned. Nor is poikiloderma congenitale mentioned. Lastly the excellence of the histological pictures might be enhanced by some indication of scale or magnification. But these are minor details that cannot mar the general conclusion—which is that this book has been badly needed for some time, that every dermatologist, especially of the younger generation, will find it essential as a book of reference, and that having acquired it he will be led to approach his subject from many new angles with considerable gain to himself and his profession.

There is one erratum on p. 279, line 15 of the second paragraph: " × the normal red blood cell count " should read " × the patient's red blood cell count." *C. H. Whittle.*

BURTT (B. D.). **A Field Key to the Savanna Genera and Species of Trees, Shrubs and Climbing Plants of Tanganyika Territory. Part I: Genera and Some Species.**—pp. xvi+53. 1939. Dar es Salaam: Govt. Printer. [2*s.*]

This little book (it can easily be carried in the pocket) is intended as a guide to those interested in the identification in the field of the woody plants of the savanna region of East Africa. It can be used by those who have no previous knowledge of botany and in the absence of a microscope. The key is not applicable to the tropical rain forests or the coastal thickets.

The booklet should be valuable to those interested in the biology of Glossina, and was completed by the author while he was working in the Department of Tsetse Research, Tanganyika Territory, just before his tragic death, with Swynnerton, in 1938. *C. W.*

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